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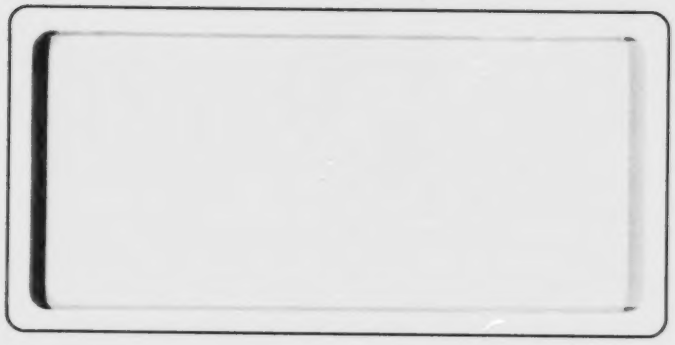

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Entente de developpement economique et regional (EDER)

This publication is jointly funded under the Canada/New Brunswick Economic and Regional Development Agreement.

OCT 25 1988

DETAILED FEASIBILITY STUDY - PHASE III

WAFERBOARD/OSB PLANT

FOR

NORTHWESTERN NEW BRUNSWICK

NEW BRUNSWICK DEPARTMENT OF
COMMERCE AND TECHNOLOGY

JOB NO. 3961

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DECEMBER, 1987
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NOTICE

The data included in this report has been prepared for the New Brunswick Department of Commerce and Technology to serve as a prospectus for the construction and operation of an Oriented Strand Board Plant in Northwestern, New Brunswick.

This report is freely available to any individual or firm interested in developing the plant. Some of the contents, however, are considered proprietary and as such, no portions of this document may be reproduced, copied, loaned or used for any purpose other than development of the said project without the written permission of NGM International.

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Detailed Feasibility Study - Phase III

Waferboard/OSB Plant

for

Northwestern New Brunswick

Department of Commerce and Technology

Job No. 3961

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Detailed Feasibility Study - Phase III

Waferboard/OSB Plant

for

Northwestern New Brunswick

Department of Commerce and Technology

Job No. 3961

1. Introduction

The Province of New Brunswick, Department of Commerce and Technology wishes to evaluate the feasibility of, and if viable, develop a prospectus for the implementation of an entry level sized composite board manufacturing facility in the Northwestern region of New Brunswick. This facility would utilize the current surplus hardwood resources in that part of the province.

NGM International was commissioned by the Department to carry out investigations and determine the viability of constructing an oriented strand board (OSB) manufacturing plant, a particleboard (PB) plant or a medium density fiberboard (MDF) plant. The feasibility study was divided into three distinct phases:

Phase I Preliminary Analysis considering OSB, MDF and PB in sufficient detail to allow a decision by the Steering Committee as to what type of plant, if any, should be considered further.

Phase II Detailed Market Research Study concentrating on the plant option decided in Phase I.

Phase III Detailed Technical and Financial Study also concentrating on the plant option decided in Phase I.

Phase I of the study was completed in June and submitted to the Steering Committee. In accordance with the results of that portion of the study and the instructions of the Steering Committee, NGM International proceeded with the Phases II and III considering in detail the oriented strand board manufacturing plant option.

This report discusses Phase III, Detailed Technical and Financial Study for the construction and operation of an entry level sized oriented strand board manufacturing plant. The marketing portion of the feasibility study, Phase II, is discussed under separate cover.

NGM INTERNATIONAL

Detailed Feasibility Study - Phase III

Waferboard/OSB Plant

for

Northwestern New Brunswick

Department of Commerce and Technology

Job No. 3961

2. Summary and Conclusions

The construction of an oriented strand board plant with an annual production rate of 138 MMSF/yr (3/8" basis) in the Edmundston area offers a Discounted Cash Flow Return on Investment (DCFROI) after taxes of 13.4% over the project life. This rate of return does not appear adequate to justify plant construction at this time, however, guaranteed lower wood costs and availability would substantially affect this position.

If raw material availability can be confirmed, the large capacity plant noted in Section 12 offers significantly improved profit potential and much higher resistance to the market price swings.

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Detailed Feasibility Study - Phase III

Waferboard/OSB Plant

for

Northwestern New Brunswick

Department of Commerce and Technology

Job No. 3961

3. Plant Description and Design Criteria

3.1 Production

The terms of reference for defining the capacity of the new plant was that it should be of a minimum economical entry level size. This is achieved by utilizing a single line flake preparation and drying process. This contrasts with larger capacity plants that utilize multiple flakers and dryers. Blending, forming, pressing and board sawing systems would tend to be similar regardless of the plant capacity; with differences primarily showing up in equipment capacity and sizes.

A single type flake preparation line utilizing currently available equipment is well balanced to a plant with an annual capacity rating of 138 MMSF/yr (3/8" basis). The annual production rate is determined by the following assumptions:

a) 20,700 SF/hr (3/8" basis) Max. Press Production Rate (8'x 16' x 9 Opening Press)

b) 50 Weeks/year (350 days) operation

c) 1 shift/week shutdown for preventative maintenance (20 operating shifts/week)

d) 3 shifts/day @ 8 hrs/shift operating

e) 15% loss of effective operating hours due to unscheduled downtime

NOTE: Factors b) to e) above result in equivalent full capacity operation of 6800 hours/yr.

A curing rate of 17 sec/mm for currently available powdered phenolic resin, together with a press dead time for 3/8" production of 201 seconds.

The finished board design density is 42 lbs/ft^3 although this may be able to be reduced during normal production while still maintaining acceptable board mechanical properties. The board produced will be a three layer oriented strand board. The surface layers will be longitudinally aligned while the core layer will be cross oriented. This concept gives improved span rating over random oriented waferboard.

Table 3.1 shows the expected plant capacities over a range of board thickness.

NGM INTERNATIONAL

138 x 10^6 SF/YR OSB Plant (3/8" Basis)

Department of Commerce and Technology

New Brunswick

Table 3.1

Plant Capacity at Various Thicknesses - 670 kg/m^3 (42 PCF) Mixed Hardwood OSB

Thickness (in)	1/4	3/8	7/16	1/2	5/8	3/4
Thickness (mm)	6.4	9.5	11.1	12.7	15.9	19.1
WT/1000 SF (lbs)	880	1310	1530	1750	2200	2630
Tons Production/Day (Avg)	197	262	271	276	287	291
S.F./Hr. (Max)	23,000 *	20,700	18,200	16,300	13,400	11,400
S.F./Day (Avg)	448,000	400,000	354,000	316,000	261,000	222,000
S.F./Year (Avg)	157 x 10^6	138 x 10^6	124 x 10^6	111 x 10^6	91 x 10^6	78 x 10^6

Press Size: 8' x 16' - 9 openings
Press Dead Time: 39 sec.
Resin Curing Time: 17 sec./mm (from mat contact to start of press opening)

* Dependant on Press Mechanical Speed, may be limited (assume maximum 20 press loads/hr.).

The boards produced would meet the following specifications:

Sizes:	4' x 8', 8' x 8', 8' x 16'
Thickness:	1/4" to 1"
Compliance:	TECO, APA, CSA
Non-Skid Surface:	All panels, one side only
Specialty Products:	Tongue and groove on 4' x 8' panels, long edges.

3.2 Raw Material

The "Study of Utilization of Surplus Hardwood Resources for New Brunswick", prepared in 1985 by Neill and Gunter Limited indicated an apparent Hardwood Annual Allowable Cut (AAC) Provincial Net Surplus of 280,000 m^3 (121,000 Cds) per year assuming that the Atlantic Waferboard Plant in Chatham was operating at its rated capacity and other planned expansions or conversions of existing New Brunswick industries occurred.

With this in mind and assuming that adjacent regions with a surplus, supplied regions with a net deficit, the apparent available surplus by region is shown below:

Table 3.2

Region	(1979) Surplus	Expected Increased Use	Difference	Balanced Apparent Available Surplus
1	122	-(20 + 50)	52	0
2	660	-(240)	(-174)	0
3	422		422	145
4	(-145)	-(50)	(-195)	0
5	275	150	125	85
Totals	740	-510	230	230

Note 1. Latest Provincial forest inventory field work completed in 1979.

Note 2. All figures Hardwood AAC, Cu. M. x 1000

Fraser's conversion of the Atholville mill has occurred and they expect to be utilizing the predicted 100,000 m^3/yr. of hardwood by next year. It must be noted, also, that as of January of this year, agreements were signed or about to be signed for the export of 50,000 m of hardwood from Region 5 to wood fired power plants in Maine. In addition, Atlantic Waferboard in Chatham is purchasing hardwood from Region 5 in order to fill its requirements. In developing the "Balanced Apparent Available Surplus" column in Table 3.2 above, it is assumed that 40,000 m^3/yr. of wood is exported to Region 2 to supply the deficit created by Atlantic Waferboard's operations in that area.

As a result of the above, the apparent available hardwood AAC surplus which could be utilized to supply the proposed OSB plant is 85,000 m^3/yr. (37,000 cds/yr).

This volume of wood, as it exists in Region 5, does not provide sufficient raw material to match the 248,000 m^3/yr. (108,000 cds/yr) requirements of the new plant.

It is felt by various individuals, however, that estimates on AAC based on the 1979 forest inventory may be rather conservative. In addition, hardwood supplies may be readily available from the Province of Quebec and the State of Maine, at competitive prices.

It is therefore highly recommended that a current detailed hardwood availability survey be carried out for Region 5, as well as adjacent areas of Quebec and Maine, prior to any decision to proceed with the plant.

The raw material hardwood resource existing in Region 5 consists of maple, birch, aspen and small percentages of other hardwood species. Northern hardwood mixes have been proven to produce a good quality structural composition board although the product density tends to be somewhat higher than boards consisting of aspen flakes alone. The reason for this relates to the relative dry densities of the different species.

Powdered phenol formaldehyde (PF) resin would be supplied to the plant in large tote bags weighing approximately 800 kg. (2000 lbs). Resin usage is calculated at 2.5% of the final product weight although many plants are operating at 2% or lower during production. It is not economical to use liquid PF resin at this time since:

a) Press cycle times are longer.

b) Additional flake drying is required.

c) Resin usage rises to 4 or 5% by weight, which more than counters the lower resin cost.

d) Liquid resin is not readily available in Northern New Brunswick, at a price competitive with powdered PF.

Liquid phenol formaldehyde or isocyanate resins may become more competitive in the future, or special market demands may require the use of liquids. The plant would therefore be designed to add liquid resin systems in the future.

Wax will be added in the form of molten slack wax of low oil content in order to improve the moisture resistance of the board. Wax will be blended into the product mix at a rate of 1.5% by weight. Wax will be delivered either by rail or highway tanker cars.

The following table provides a summary of the wood, resin and wax usage expected over a full operating year.

Table 3.3

Raw Material Consumption

	Annual	Daily
Plant Production:	138 x 10^6 ft^2 (3/8")	400,000 ft^2 (3/8")
Wood Consumption:	248,000 m^3/year (108,000 cds/year)	709 m^3/day 309 cds/day)
Resin Consumption:	2,250 tonnes/year	6.4 tonnes/day
Wax Consumption:	1,350 tonnes/year	3.9 tonnes/day

Expected raw materials unit costs for wood, resin and wax are:

Wood:	$60.00/cd.
Resin:	$1.46/kg ($.66/lb)
Wax:	$.44/kg ($.20/lb)

The availability of powdered phenol formaldehyde resin and slack wax is good with surplus production facilities currently in existence in Ontario.

3.3 Site Selection

The proposed site location for the new plant is in the St. Hilaire Industrial Park, located on Highway No. 120, 10 km South of Edmundston, New Brunswick.

The plant property will cover an area of approximately 12 Ha (30 Acres) and encompass lot Nos. 8, 9, and 39 to 48 inclusive.

The site is readily accessible from Highway No. 120 as well as the Canadian National Railway main line between Edmundston and Montreal.

Existing site services include water (12" main) and sanitary sewer, both of which pass by, under the road. Water is supplied by gravity from a 500,000 US Gallon storage tank located on a hill across the road from the Park. Static water pressure at the Park is 65 psig. Sanitary sewer drainage is to a stabilization pond within the park boundaries.

The site topography is generally flat with little grading required to obtain an ideal plant site base. The majority of the site at present is under cultivation and as such does not require any major clearing and grubbing work.

It is recommended that accurate soils testing be carried out prior to design of the building or equipment foundations. However, based on generalizations made from borehole tests done in 1973, the soil conditions are favorable for construction of a plant of this nature.

Discussions with NBEPC have resulted in their proposal to service the site at 69 kV via a line extension from NBEPC Line 70. This will require the construction of about 5 km of 69 kV line. NBEPC will provide the line extension at no cost to the Customer other than a bank guarantee for a period of five years in the amount of the construction cost of the line which they estimate at approximately $200,000. The amount of the guarantee would decrease

twenty percent for each year of plant operation. The 69 kV substation would be the responsibility of the Customer. Optionally, NBEPC will provide the substation, excluding civil work, fencing and secondary connections, on a rental basis at 1 2/3% per month of installed capital cost. This substation would supply power to the plant at 600 volts, 3-phase, 60 Hz.

The substation transformer will be an oil-filled type mounted outdoors. 600 volt switchgear will be mounted indoors in an electrical room with the motor control centres.

Fire protection will be provided via an underground perimeter type pipe loop system supplied with water from the 12" water main. A diesel powered fire pump will boost the water pressure to the sprinkler system.

Site paving will be limited to those areas where heavy traffic requires it.

Fencing will encircle the entire plant area.

3.4 Buildings and Building Services

The building will be approximately 125,000 ft^2 in size and be of a pre-engineered, pre-fabricated steel building system. Walls and roofs will include substantial insulation with metal inner liners. The building will rest on concrete grade walls. All floors on grade and most elevated floors will be concrete slab construction. The entire building area will be protected by sprinklers and fire protection hoses. Steel access ladders, stairs

and platforms will be installed to provide good access to the equipment for normal maintenance and operational checks. Enclosures within the main plant will generally be of concrete block construction. Monorails and hoists will be provided for critical maintenance areas as well as normal plant operational requirements. Adequate lighting as well as an overall fire alarm system will be provided throughout the building. The building will have an appropriate grounding system.

Power and control cable will be interlocked armour cable run in cable tray.

Lighting will generally be high pressure sodium in the plant and for site lighting and fluorescent in offices and electrical rooms.

An emergency generator will provide power for the dryer drum and plant emergency lighting.

Compressed air will be produced by two 650 SCFM rotary air compressors including air filtering and drying.

Light oil or propane will be used for back-up purposes in the thermal oil heaters and for light-off of the dryer solid fuel burners.

Building and hot pond heating will be provided by the thermal oil heating system.

The warehouse space will be approximately 30,000 ft^2 or sufficient for (2) two weeks storage, based on a stacking height of 6 bundles.

3.5 Equipment Description and Design Capacities

.1 Mobile Equipment (Plant Area 30)

The following mobile equipment will be needed for the plant:

1 - Cat 980 Wheel Loader c/w grapple

1 - Drott Log Carrier c/w grapple

1 - Front Bucket Wheel Loader (used) Cat. 960 or equal

2 - Fork Lift Trucks (Gas)

2 - Pick Up Trucks

NOTE: Primary log receiving, storing and reclaiming will be performed by a fixed grapple and the log carrier.

.2 Wood Receiving (Plant Area 40)

The wood yard operation must handle 108,000 cds/year of log length (max. 8'-6") aspen, birch and maple, while providing a minimum of 3 months or 27,000 cds log storage. The primary method of log handling, storage and retrieval will be via travelling grapple loaders. The log storage area of the plant will require approximately 9 acres of land for storage and reclaim of the 90 day spring break up storage requirments.

Approximately 38 log trucks per day are required to supply the plant needs, based on loads of 14 cds/truck and 200 delivery days per year.

Log trucks will be weighed at a truck scale near the plant.

Reclaimed logs as well as logs newly arrived on trucks will be fed by a fixed grapple into one of two 10' x 250' long hot ponds. Waste will be collected for use as fuel in the thermal oil heaters.

.3 Wood Handling (Plant Area 50)

Logs will be fed through the hot ponds by log forwarder conveyors that allow the ponds to be filled almost to the bottom with logs, or to a depth of about 5 feet. Minimum residence time in the ponds is 6 hours. The ponds will feature a self-cleaning type of design. Jackladders will lift the logs out of the ponds and feed them onto a conveyor to a ring type debarker. A metal detector down stream of the debarker will provide protection for the flaker.

.4 Flaking and Wet Storage (Plant Area 60)

Flake length will generally be 3" long and the width of the flakes 1 1/2" and less to provide proper furnish for the OSB product.

Flakes will then be conveyed to a 10,000 ft^3 wet storage bin that will provide storage capacity for two hours of plant operation.

Knife grinding equipment will be installed adjacent to the flaker to provide sharpening service for the flaker knives.

.5 Drying (Plant Area 70)

The flakes will be metered out of the wet flake bin at uniform rates and dried in one (1) - 13' x 60' triple pass suspension

burner fired rotary dryer. Dry flakes at 4% moisture will outfeed from the dryer primary cyclones to a reversible fire dump conveyor. Downstream of the fire dump conveyor, the flakes pass into a 10' diameter by 30' long rotary screen for fines removal.

.6 Dry Storage and Blending (Plant Area 80)

Accept flakes from the screen will be conveyed to one of two 3,000 ft^3 storage bins. The dry bin storage volumes will provide 1 hour of plant operation.

Flakes will be metered out of the dry bins at uniform rates and the flow will be continuously weighed as the flakes are fed into the blenders. Loss of weight feeder systems will meter resin and wax into the 10' dia. by 28' long blender drums at fixed ratios following closely the flake flow rates.

Wax and resin will be bulk stored in separate areas adjacent to the blender. Provision will be made for future installation of liquid phenolic and isocyanate resin handling equipment.

.7 Forming and Pressing (Plant Area 90)

The mats will be formed in a continuous fashion by two surface and one core layer forming machines. The surface layer formers will orient the flakes lengthwise on the mat while the core formers will orient the flakes across the width of the mat at 90^0 to the surface layer flakes. After forming, the mats are separated using a travelling cut-off saw and loaded

into the press loader on screen type cauls or conveyor belts. As the loader charges the press with the new mats, simultaneously the unloader withdraws cured raw boards and their screen cauls, if necessary, from the press.

Outfeeding from the unloader, the raw boards are separated from the screens, if used, and sent to the cut-up system. The screens are recirculated below the press for re-use.

The press will be a 9 opening, nominal 8' x 16' size, 750 psig capable of 20 loads/hour on 1/4" board.

.8 Trim and Grade System (Area 100

The trim and grade system receives raw boards from the press unloader and from there, provides the following functions:

a) Board Weighing

b) Emergency Take-Out and Re-Insertion

c) Board Cut-Up and Trimming

d) Edge Profiling (tongue and groove) (if desired on 5/8" or 3/4" thicknesses)

e) Grading

f) Edge Sealing

g) Stacking and Strapping

The tongue and groove machines will be installed on slides so that if not required, they may be moved out of the line to accomodate servicing without interfering with plant production.

.9 Heat Energy System (Plant Area 110)

In this type of plant, for northern climates, a balance generally exists between the heat content of available plant wood wastes and the process and building heat requirements. However, depending on such parameters as wood quality, efficiency of operation, time of year and other criteria there may be more waste produced than is required for fuel or, alternatively, in some cases deficiencies which must be made up with fossil fuels or more preferably, wood waste from other sources (i.e. adjacent saw mills).

The expected deficiency of dry fuel for the dryers in winter will be made up with heat from the wet fuel combustion units.

The heat energy system will consist of two 20 million BTUH wet fuel combustion/thermal oil heating units. Hot thermal oil will be supplied by the heaters at temperatures of up to 480^{o}F and be used as a heating medium for:

1. Press Heating
2. Wax Tank Heating
3. Hot Pond Heating
4. Building Air Make-Up Heaters

3.6 Plant Design Criteria

.1 Civil Design Criteria

.1 The Project

The following data outlines the design criteria for the civil work for the proposed OSB plant at St. Hilaire, New Brunswick. This section establishes the guidelines for detailed civil design of the plant and should be thoroughly reviewed by the Owner before proceeding with design.

.2 Codes

.1 General

The design of all structures shall conform to the requirements of the National Building Code of Canada and its latest supplements except as modified herein.

.2 Reinforced Concrete

All reinforced concrete shall be completed in accordance with the CSA A23.1 - M84, A23.2-M84 "Concrete Materials and Method of Construction" Standard.

.3 Structural Steel

Structural steel work shall conform to the CSA CAN 3-S16.1-M84, "Steel Structures for Buildings" Standard.

.3 Loads

In addition to loadings specified in the codes above, the following loadings shall be used in design of structures.

.1 Roofs

Piping and lighting load	15 psf.
Specific point loads (i.e. hoists)	As required

.2 Slab on Grade

Plant	400 psf.
Warehouse	800 psf.

.3 Walkways 125 psf.

.4 Site Work

.1 General

The plant under consideration would be built on the site noted previously.

.2 Excavation and Grading

All excavation and grading work shall be conducted in accordance with good practice and as required by the final intended use of the site or portion thereof. The building and structures will be layed out so as to use the natural grade as much as possible. Maximum yard grades of 3% will be maintained in order to allow easy movement of mobile equipment. After rough grading, all work areas will be surfaced with suitable granular material, in thickness as required to provide satisfactory working surfaces but generally not less than 1 foot.

.3 Paving

Asphalt and concrete paving will be used to surface the main plant access road, parking lot and shipping areas. All other roads and yard areas will be gravel surfaced.

.4 Railway

A railspur will provide service to the warehouse areas.

.5 Storm Drainage System

All grading in the area of the plant and woodyard will be completed so that all drainage would be carried to collector ditches for discharge from the site. Suitable perimeter ditching will be provided to divert drainage from surrounding areas away from the plant site.

.6 Fire Protection

The complete plant will be protected by a primary loop, with hydrants around the outside of the building, as well as a sprinkler system.

Water will be supplied from an off-site, gravity storage tank with booster pumping capacity as required.

.5 Building and Structures

.1 Foundations

Foundations for the building shall generally be spread footings or concrete pile caps as required. Equipment foundations shall generally be spread footings or mat

foundation founded on original material or controlled fill. Allowable bearing pressures and pile capacity shall be determined from soil tests conducted by others.

.2 Slabs on Grade

Concrete slabs on grade shall be designed for a minimum of 400 psf with the exception of the warehouse which shall be designed for a 800 psf loading. The warehouse slab and the maintenance shop floor slab shall receive a metallic hardener for protection from fork lift traffic.

Slabs on grade shall be founded on a minimum 6 inch layer of clean gravel compacted to 95% modified Proctor density at optimum moisture content.

.3 Structural Steel

Structural steel shall meet the code requirements of 2.3 above and shall have strength properties equivalent to or better than CSA G40.21-M. Field connections shall be made with ASTM A325M high strength bolts.

.4 Miscellaneous Metals

Handrails shall be constructed from 1 1/4" nominal schedule 40 steel pipe. Posts shall be at 8 foot maximum centers and radiused bends shall be used at all changes in direction and at ends of runs.

Walkways shall consist of welded steel grating or checker plate designed for a minimum loading of 125

psf. Bearing bars for grating shall be 1 1/4" x 3/16" minimum and cross bars shall be at 4" maximum centres. All walkways shall be complete with kickplates.

.6 Shop Paint

.1 Cleaning

All surfaces to be painted shall be prepared in the following manner prior to application of the paint:

(1) All soil and dirt shall be removed by brushing and scraping.

(2) Oil or greases shall be removed by wiping the surface with rags or brushes wetted with approved solvent until it has been removed completely.

(3) "Commercial Blast Cleaning" shall be the minimum acceptable surface preparation to S.S.P.C. - SP6 latest edition.

(4) Rough welds and sharp steel edges shall be ground smooth and all weld spatter shall be removed.

(5) Immediately before any paint is applied, the surfaces to be painted shall be brushed or wiped with a clean cloth to remove any newly formed rust or other loose material.

.2 Painting

On completion of the surface preparation the steel shall be primed and top coated as follows:

Primer: - One coat of 2.0 mils dry film thickness. Primer shall be Mobil 13-R-56 Val-Chem Zinc Chromate Epoxy primer or approved equal.

Top Coat: - One coat of 4.0 mils dry film thickness. Top coat shall be Mobil 89-F-34 Hi-Build Epoxy or approved equal.

.7 Architectural

.1 General

A specification will be issued to Contractors for proposals on the following building type: Pre-engineered steel building frame with insulated metal wall system. An 8" concrete or masonry dado wall (6 ft. high) will be used in areas where cleaning with a wheel loader is necessary.

.2 Wall Cladding

Exterior wall cladding shall be of 26 gauge (minimum) galvanized pre-painted steel, having a minimum profile depth of 1 1/2". Cladding is to be designed to withstand the specified wind loads of the area with the girt spacing used.

Insulation shall be fiberglass and applied to the walls so that the overall wall will have a "U" factor

of not less than 0.05. The interior surface of the insulation shall be covered with a fire retardant vinyl-aluminum foil laminate vapour barrier having a permeability rating of 0.10 perm or less. All seams shall be sealed to form vapour proof joints.

The interior liner sheet shall be 26 gauge (minimum) galvanized pre-painted steel. It shall be installed and attached to the inside face of the girts and in accordance with the building manufacturer's approved standards.

.3 Roofing

The roof deck shall be 24 gauge (minimum) standing seam aluminum coated steel. Roofing shall be designed to withstand the specified snow and wind loads with the purlin spacing used.

The roof insulation shall be fiberglass and applied to the roof so that the overall roof will have a "U" factor of not more than 0.03. The interior surface of the insulation shall be covered with a fire retardant vinyl-aluminum foil laminate vapour barrier having a permeability rating of 0.10 perm or less. All seams shall be sealed to form a vapour-proof joint. Flashing shall be installed in accordance with the building manufacturer's standards to provide a completely weatherproof building.

.4 Doors

Mandoors shall be metal clad wood core with heavy duty stainless steel hardware.

Truck doors shall be high lift insulated metal doors with heavy duty rails and rollers. Electric operators shall be located as directed by the Owner.

The shipping truck and train doors shall be sectional vertical lift insulated metal doors complete with electrical operators and heavy duty hardware.

.5 Interior Partitions

Interior partitions shall be concrete masonry units within the plant proper and wherever fire separations are required.

Partitions within the office area shall be wood stud and gyproc or panel.

.2 Mechanical Design Criteria

.1 The Project

The following data outlines design criteria for the mechanical work at the proposed plant at St. Hilaire, New Brunswick. This section establishes the guidelines for detailed mechanical design of the plant and should be thoroughly reviewed by the Owner before proceeding with design.

.2 General

The mechanical system design for the plant is based on obtaining competitive bids on all major items of mechanical equipment.

On the basis of present scheduling, it is planned to issue the mechanical installation contract on the basis of a lump sum contract. This contract will include the installation of all major mechanical equipment and piping. The major mechanical installation contract includes the installation of air, water, and thermal oil piping and will be based on the Contractor supplying all piping, fittings and valves not already included in equipment supply contracts.

.3 Codes

.1 Thermal Oil System

The thermal oil heating system shall be designed to perform to the ANSI Code for Power Piping, latest edition (B31.1 - 1986). Materials to be in accordance with the requirements of the ASME Codes.

.2 Heating and Ventilating Systems

The heating and ventilating systems shall be designed in accordance with recommended practices outlined in the ASHRAE Guide Books. Duct work associated with the ventilation system shall be designed and installed in accordance with the Sheet Metal and Air Conditioning Contractors National Association (SMACNA) recommendations.

.4 Design Criteria

.1 Heating Systems

Outside design temperatures:

$28^{o}C$ Summer-Dry Bulb

22°C Summer-Wet Bulb

-30°C Winter - 1% Design

Plant design temperature:

38°C - 18°C

Warehouse design temperature:

38°C - 10°C

Office and employee facilities:

22°C - 24°C

.2 Ventilation Systems

Offices:	15 CFM per person
Washrooms:	30 CFM per occupant
Locker Rooms:	30 CFM per locker
Resin Storage Room:	2 CFM per sq. ft. (7.5 air changes/hour)
Wood Room:	3 air changes/hour (summer)
Press Area:	Set by equipment heat load
Control rooms:	Air conditioned

.5 Equipment

.1 Air Make-Up Units

Steel and aluminum construction, centrifugal fans, with process heat recovery as economically justified.

.2 Roof Exhausters

Axial or centrifugal steel/aluminum construction.

.3 Office and Control Room Air Conditioning

Roof top unit, air-cooled condenser.

.4 Duct Work

Galvanized steel per SMACNA standards.

.3 Electrical Design Criteria

.1 The Project

The following outlines the design criteria for electrical work at the proposed OSB plant in the St. Hilaire Industrial Park. Thorough review of the proposed design criteria by the Owner is recommended prior to proceeding with design.

.2 Electrical Procurement

In general, procurement will be handled on a competitive bid basis.

Electrical items of equipment will fall into the following general categories:

.1 Owner Furnished

Items procured directly by the Owner based on specifications or materials lists prepared by NGM International.

Process equipment purchased by the Owner will not include motor starters except in special cases.

The following items will be purchased by the Owner:

.1 Primary Power - The Owner will purchase the 69 kV substation and related equipment to supply 600 volt power to the plant.

.2 600 volt Substation Switchgear.

.3 600 volt Motor Control Centres - Motor control centres will be purchased by the Owner. MCC's will be 1600 A mains with 65,000 amp bus

bracing. Each starter will be complete with a fused disconnect switch.

.4 All motors will be purchased with the mechanical equipment.

.5 Capacitors for Power Factor Correction.

.6 Programmable Controllers (These will be supplied with the mechanical equipment).

.7 Instrument and/or Pushbutton Control Panels. (These will be supplied with the mechanical equipment).

.8 Control Power Panels located within the motor control centres.

.2 Contractor Furnished

Items to be procured and supplied by the electrical installation contractor.

.1 All labour, supervision and construction equipment as necessary to complete the work as shown on the contract drawings or as specified in the specifications.

.2 600 volt insulated power wire and cable. Cable will be supplied by the Contractor as required. Cable will be interlocked armored Teck cable.

.3 600 volt multi-conductor control cable. Cable will be supplied by the Contractor as required. Control cable will be interlocked armored Teck cable.

.4 Conduit and conduit fittings.

.5 Outlet, junction and pull boxes.

.6 Cable tray, wiring channel and fittings.

.7 Safety switches.

.8 Cable terminators.

.9 Supports and hangers.

.10 Separately mounted manual motor starters.

.11 Separately mounted pushbuttons, pilot lights, control and selector switches.

.12 Lighting switches, receptacles, and other wiring devices.

.13 Grounding wire and cable.

.14 600 volt 1/C wire.

.15 600 - 208/120 volt transformers for miscellaneous power distribution and 120 volt fluorescent and incandescent lighting.

.16 Panelboards for miscellaneous 120 volt distribution.

.17 600 - 600/347 volt transformers for the main plant and site high pressure sodium lighting.

.18 Lighting panelboards.

.19 Lighting fixtures and ballasts.

.20 Lamps

.21 600 volt power receptacles.

.22 Separately mounted magnetic motor starters unless otherwise noted.

.23 Thermostats.

.24 Electric heaters.

.25 Cable clamps and ties and wire markers.

.26 Bolts, nuts, tape, expendable tools and all miscellaneous construction materials not specified as being supplied by the Owner.

.3 Equipment Designation

All major electrical equipment and circuits will be identified generally as follows:

.1 All unit substations will be assigned a number and identified.

.2 All feeder breakers will be assigned a number and identified. eg, Breaker 1W...Feeder Breaker for Woodhandling MCC No. 1W.

.3 All motor control centres will be assigned a number and identified. eg, MCC No. 1W...Woodhandling MCC No. 1W.

.4 All motor starters and disconnect switches in a motor control centre will be assigned a number and identified. eg, Circuit No. 1W1...Log Infeed Deck.

.5 Cables associated with a particular piece of equipment will be identified using the motor control centre circuit number, followed by a letter designation. eg, Cable No. 1W1-P...Power cable to motor.

.6 All local control devices will be provided with engraved nameplates bearing the circuit number and the name of the driven equipment.

.7 Cables terminating at motors, solenoids, pressure switches, etc. will be identified at the load end with the cable number.

.4 Power Distribution System

.1 Primary power supply to the site by NBEPC will be 69 kV, 3-phase, 4-wire, 60 Hz.

.2 Utilization voltages.

.1 Power secondary voltage - 600/347 V high resistance grounded.

.2 Lighting - 600/347V and 208/120V.

.3 Miscellaneous power for single phase motors, chart recorders, solenoids, etc. - 120V.

.4 600 V motor control circuit voltage - 120 V.

.5 Power to motor control centres will be cable in cable tray. Power to motors will be cable in cable tray and where suitable, under-slab conduit to equipment locations with routing on equipment to motor. Under-slab conduit will be kept to a minimum.

.3 Plant power factor will be corrected by the addition of capacitors to automatically control power factor at 90%.

.5 Substation

.1 The substation will be 3000 KVA, 600/347 volt high resistance grounded secondary, 3 phase, 60 hertz, with 3-pole fused primary; outdoor liquid-filled transformers with main secondary circuit breaker

complete with static trip device, ground sensors, and 1600 amp secondary feeder circuit breakers as required.

.2 Low voltage feeder circuit breakers will have solid state trip units.

.3 Substation metering will be as follows:

.1 Secondary Main Bus. - Voltmeter and switch, ammeter and switch, WH meter, power factor meter.

.2 Feeders - Ammeter and switch.

.6 Motors

.1 Motors will be T-frame rated 575 volts, long shaft.

.2 In general, all AC motors through 125 HP, all speeds, will be TEFC, 1.15 S.F. AC motors 150 HP and above, all speeds, will be drip-proof, 1.15 S.F. except where conditions require TEFC enclosures.

.3 AC motor voltage and phase requirements:

.1 Process Motors - All process motors will be 3 phase, 60 Hz., 575 volts.

.2 Building Service Motors - 1/2 HP and larger 3 phase, 60 Hz, 575 volts. Smaller than 1/2 HP - 115 volt, single phase, 60 Hz.

.4 250 HP and larger motors will be provided with RTD or thermistor trips for over temperature protection.

.7 Motor Control Centres - 600 volts

.1 Construction - Back-to-back type using EEMAC 1 enclosures.

.2 The smallest size starter used will be Size 1.

.3 Combination starters with disconnect switches and Form I Class J current limiting fuses. Door interlock with disconnect switch to have defeater device to permit electricians to intentionally open without de-energizing the circuit.

.4 Wiring to be EEMAC Class 1 Type B.

.5 Control circuit voltage will be 120 volt, AC, separate control obtained from 600-120 volt control transformers.

.6 No pushbuttons, selector switches or indicating lights will be used on motor control centre doors.

.7 Spare starters and future space - Motor control centres will <u>each</u> have approximately 20% "spare" EEMAC size 1 or 2 combination starters plus 1 - 30 amp and 1 - 60 amp "future" switch. In addition, each MCC will have one (1) complete vertical section for "future" expansion.

.8 Donut type current transformers will be used where remote indication of motor current is required.

.9 Each starter will be equipped with three (3) overload relays

.8 <u>Control Devices and Panels</u>

.1 Pushbuttons will be located on operator's panels where applicable.

.2 "Stop" pushbuttons on panels and consoles will be non-illuminated type with "Red" colour, 120 volt, AC,

separate control obtained from 600-120 volt control transformers.

.3 Pushbuttons, indicating lights, selector switches, etc. will be Allen-Bradley Bulletin 800T heavy duty, oiltight units. Other types will be considered in Vendor supplied consoles if a premium is required to obtain the Allen-Bradley pushbuttons.

.4 Solenoids - 120 volt coils - ASCO.

.5 Where armored control cables enter panels, consoles and MCC's from the bottom through boxouts, the opening will be sealed with an aluminum plate and the armor will be terminated and grounded at the plate.

.6 Control Consoles and Control Panels

.1 Internal wiring will be in Electrovert "Electro Duct" plastic wiring duct. Duct fill not to exceed 50%.

.2 All internal power and control wiring to be 600 volt, No. 14 AWG, stranded, flame-retardant switchboard insulation.

.3 Consoles to have hinged access doors in rear and/or front as required.

.4 All electrical components will be suitably identified in accordance with panel connection diagrams. Terminal strips and both ends of each wire to be marked with wire number.

.9 Lighting

.1 Lighting will be 208/120 volts, three phase or 600/347 volts, 3 phase, as required. In general, lighting will be at 347 volts to effect economies inherent in the higher voltage system.

.2 Primary source of power is 600 volt to be taken from motor control centres, as required.

.3 Lighting transformers will be 600 - 600/347 volt, 3 phase, or 600 - 208/120 volt, 3 phase, indoor, dry type, with two (2) - 2 1/2% taps above and below normal primary voltage, and standard insulation and temperature rise.

.4 Convenience Receptacles.

Production area duplex receptacles will be 2-pole, 3 wire, grounded, polarized, 15 amp, 125 volt, mounted in case aluminum FS box with hinged flap. Office area duplex receptacles will be 2-pole, 3-wire, grounded, polarized, 15 amp, 125 volt, mounted in switch box with stainless steel cover.

.5 Yard lighting will be accomplished, wherever possible, by floodlights from buildings. Pole-mounted floodlights will be provided where necessary.

.6 Lighting intensities will be as follows:

.1 Wood Handling

- 20 fc high pressure sodium

.2 Wafer Preparation

- 20 fc high pressure sodium

.3 Board Production

- 30 fc high pressure sodium

.4 Maintenance Shops

- 50 fc high pressure sodium

.5 Press Hydraulic Room

- 30 fc high pressure sodium

.6 Thermal Oil Heater Room

- 30 fc high pressure sodium

.7 Grading Area

- 50 fc high pressure sodium

.8 Office Areas

- 70 fc fluorescent

.9 Warehouse

- 20 fc high pressure sodium

.10 Electrical Rooms

- 30 fc fluorescent

.11 Knife Grinder Room

- 50 fc fluorescent

.7 Circuiting

.1 Minimum wire size will be No. 12 AWG, stranded.

.2 Minimum conduit size will be 3/4" except 1/2" for fixture stems.

.8 Emergency lighting will be provided by an emergency diesel generator.

.9 Instrumentation and Process Control 240/120 volt power. This service will be accommodated separately from lighting. It will have its own feeders,

transformers, panel boards, and circuits completely separate from the lighting.

.10 Wire and Cable

.1 600 Volt Power Cable - 3/C interlocked armor Teck 90 cable, copper conductors, 90°C cross-linked polyethlene insulation, PVC inner jacket,aluminum interlocked armor, bare copper ground wires, black PVC overall jacket.

.2 600 Volt Control Cable - Multiconductor interlocked armor Teck cable, copper conductors, No. 16 AWG, 90°C cross-linked polyethylene insulation, color coded, PVC jacket over cabled conductors, aluminum interlocked armor, black PVC overall jacket.

.3 600 Volt Lighting Cable - 1/C stranded copper conductors, Type RW90, color coded insulation, 90°C cross-linked polyethylene installed in rigid metal conduit.

.4 Sizing of Motor Leads - Cables in tray will be sized on the basis of derating to 70% of the ratings given in the Canadian Electrical Code to allow for unspaced installation of cables in tray.

.5 Armored Cable Conductors - Connectors will be T & B dry-type within the Electrical and Control Rooms; water-tight outside these areas.

.6 Wire Connectors - Solderless connectors will be used for connecting and splicing all wire regardless of size. For wire up to and including No. 10 AWG, use T

& B Stakons. Wire No. 8 and larger, use T & B "Colour-Keyed" compression type connectors. Use compression connectors and bolts for all motor connections.

.7 Wire Marking - Identify both ends of wires with markers to correspond with the wiring diagrams.

.11 Conduit System

.1 Materials - All conduit will be rigid galvanized except as otherwise noted.

.2 Conduit Fittings - Individual conduit fittings are to be used in preference to pull boxes where applicable. Aluminum fittings are to be used with aluminum conduit and galvanized steel fittings with steel conduit. Fittings will be as manufactured by Crouse-Hinds and die-cast type will be used whenever practicable.

.3 Conduit Hangers and Supports - To be hot dipped galvanized 4-channel with a liberal amount of space prcvided. Expansion joints will be necessary for long straight runs of aluminum conduit. Care will be taken to support aluminum conduit at sufficiently short intervals so as to prevent any appreciable deflection. Pipe straps will be malleable iron type.

.4 Grouping of Leads - The practice of extensive grouping of wires in either junction boxes, conduits or otherwise will be avoided. Wires for a given piece of

equipment will be isolated from those of another insofar as practicable.

.12 Tray and Rack System

.1 Cable Tray and Ladder Racks - Class C1 heavy duty galvanized steel construction as manuafactured by Pilgrim, Electrovert or equal.

.2 Loading - Initial design loading of trays will be limited to 75% with power cables stacked one deep and control cables stacked two deep.

.3 Segregation of Leads in Trays - The practice of extensive grouping of wires in trays will be avoided. Control leads are to be kept segregated from power leads as far as practicable.

.4 Tray hanger rods and hardware will be stainless steel.

.13 Grounding System

.1 General - The main subgrade ground mat will consist of closed cable loops of bare copper cable run around and across the perimeter of the building structure. Cables will be connected to driven ground rods at sufficient intervals to provide a uniform potential gradient throughout. Main ground mat will be connected by risers to building steel columns.

.2 Connections:

.1 All cable to cable, cable to ground rod and cable to building steel will be with a thermal powder process equal to the "Cadweld Process", or Burndy Hyground system.

.2 Connections to equipment will be of the compression type solderless connectors.

.3 Risers - Where ground cable passes through floor slab, it will be painted with bituminous paint. At floor level and immediately above, cable will either be protected against mechanical damage by sleeve or other suitable means or will be run close enough to column, building wall, foundation, etc., so it will not be exposed to such damage.

.4 Conduit will be grounded and continuous.

.5 Tray and Rack Systems - Tray and rack systems will be grounded and continuous but will not be used as the equipment grounding circuit.

.14 Telephone, Signal, Fire Alarm, and Communications

.1 Telephone - Conduit, plywood backboard and equipment space will be provided to comply with the telephone company requirements.

.1 Phone Outlet Boxes - FS conduit or switchbox as required with bushed cover.

.2 Wiring - Telephone company will furnish, install and connect all wiring for this system.

.2 Internal Communications - Any requirements for internal communication other than telephones will be determined at a later date to suit the Owner's specific requirements.

.3 Fire Alarm - The fire alarm system shall be a single stage zone coded system.

It shall include detectors for flow in sprinkler systems, manual pull stations in electrical rooms, control rooms, exits, and at specific points in the plant, and ionization detectors in electrical rooms and control rooms.

.15 Miscellaneous

.1 Power Receptacles - 600 volt, 3 phase, 60 amp, 3 wire, 4 pole power receptacles will be Crouse-Hinds Catalog No. AREA 6424 with fused disconnect switch.

3.7 Environmental Criteria

This plant must comply with the air emissions requirements as defined by the New Brunswick Department of Environment, Air Resources Branch. The primary air pollutant emissions for a plant of this nature is particulate matter, from the dryer and heat energy stacks.

Stack opacity, which is a measure of the degree of light transmission through the stack gas, must be limited to less than 20%. Particulate emissions must be limited to 500 mg/m^3 of dry gas at standard conditions and corrected to 12% CO_2. Maximum particulate emissions from a single emitting point must be limited to 60 kg/hr or below.

The plant process equipment must be designed to operate below the above rates.

Equipment is currently available which should readily meet these emissions requirements.

Other sources of process waste to the environment would be in the form of excess wood waste and ash from the wood combustion units. These items may readily be disposed of in land fill operations.

Since the plant will utilize a dry process, no liquid effluent will be released with the exception of infrequent hot pond drainings due to cleaning. Sewage from the plant will be disposed of in the on park waste treatment pond.

NGM INTERNATIONAL

Detailed Feasibility Study - Phase III

Waferboard/OSB Plant

for

Northwestern New Brunswick

Department of Commerce and Technology

Job No. 3961

4. Capital Cost Estimates

4.1 Summary

The capital cost estimates for the project were developed using quotations from the major equipment suppliers as well as equipment take-offs and estimates based on the proposed plant layouts contained herein. Following is a summary of these costs.

10	Site and Site Development	$1,081,000
20	Buildings and Structures	$8,045,000
30	Mobile Equipment	$600,000
40	Wood Handling	$1,080,000
50	Flaking and Wet Storage	$1,345,000
60	Drying	$1,901,000
70	Storage and Blending	$1,490,000
80	Forming Equipment	$1,450,000
90	Pressing Equipment	$5,720,000
100	Trim, Grade and Strapping	$1,100,000
110	Heat Energy System	$2,451,000
120	Maintenance, Office and Lab Equipment	$195,000

130	Electrical Equipment and Installation	$3,155,000
140	Mechanical Equipment Installation	$3,605,000
150	Manufacturer's Representatives	$308,000
160	Spares Parts	$500,000
170	Engineering and Project Management	$1,985,000
	Subtotal	$36,011,000
+	Contingency @ 10%	$3,601,100
+	Escalation @ 5%	$1,800,550
+	Construction Interest	$419,603
	Project Total	$41,832,253
	USE	**$42,000,000**

4.2 Estimate Breakdown

Area 10	Site and Site Development	
	Cost of Land	$100,000
	Soils and Conc. Testing	$15,000
	Yard Grading	$200,000
	Gravel	$50,000
	Drainage and Culverts	$20,000
	Paving	$50,000
	Rail Siding	$150,000
	Fire Mains, Pumps	$170,000
	Potable Water & Sewage	$20,000
	Surveying, Topo. & Staking	$10,000
	Fencing	$66,000
	Miscellaneous Exterior Foundations	$80,000
	Exterior Lighting	$50,000
	Total Site and Site Development	$1,081,000
Area 20	Buildings and Structures	
	Building Enclosure	$2,650,000
	Building Foundations & Slabs	$1,475,000
	Fire Protection	$420,000
	Equipment Foundations	$1,050,000
	Structural Steel & Miscellaneous Metals	$475,000
	Masonry	$300,000
	Painting and Finishes	$300,000
	Plumbing	$80,000

	Lighting	$400,000
	Heat, Vent. & Air Conditioning	$520,000
	Hot Ponds & Enclosures	$375,000
	Total Buildings & Foundations	$8,045,000
Area 30	Mobile Equipment	
	2 - Forklift	$70,000
	1 - Carry Lift	$150,000
	1 - Log Loader Cat 980 C/W Attach.	$300,000
	1 - Cat 980 Used Back-up Unit	$50,000
	2 - Pick Up Trucks	$30,000
	Total Mobile Equipment	$600,000
Area 40	Wood Handling	
	Yard Scales	$70,000
	Tanguay Loader	$80,000
	Log Conveyors	$75,000
	Debarker	$250,000
	Hot Pond Wood Handling Equipment	$435,000
	Pond Heat Exchanger	$20,000
	Woodroom Controls	$150,000
	Total Wood Handling	$1,080,000

Area 50	Flaking and Wet Storage	
	Flaker	$750,000
	Flake Conveyors	$80,000
	Wet Flake Storage Bin	$375,000
	Knife Grinder	$125,000
	Flaker Knives	$15,000
	Total Flaker & Wet Storage	$1,345,000
Area 60	Drying	
	Drying Systems	$1,571,000
	Flake Conveyors	$180,000
	Dry Screen	$125,000
	Spark Detection	$25,000
	Total Drying	$1,901,000
Area 70	Dry Storage & Blending	
	Dry Flake Storage Bins	$350,000
	Blending & Dosing	$595,000
	Bin & Blender Discharge Conveyors	$285,000
	Wax Storage & Handling System	$60,000
	Bulk Resin Handling (Elec. Hoist)	$20,000
	Control System	$180,000
	Total Dry Storage & Blending	$1,490,000

Area 80	Forming Equipment	
	Forming Station & Supports	$915,000
	Forming Line	$470,000
	Mat Reject Bin	$65,000
	Total Forming Equipment	$1,450,000
Area 90	Pressing Equipment	
	Press Loader	$1,160,000
	Hot Press	$4,000,000
	Press Unloader	$470,000
	Press Hood	$30,000
	Hydraulic Oil	$60,000
	Total Pressing	$5,720,000
Area 100	Trim, Grade and Strapping	
	Board Scale & Infeed System	
	Trim Saws c/w Infeed & Discharge System	
	Mirror Grade, Stack & Strap. Conveyor	
	Strapping Machine	
	Total Trim Grade & Strapping	$1,100,000

Area 110	Heat Energy System	
	Hot Oil Heating Units	$2,025,000
	Reclaim Bin & Wood Waste Conveyor	$95,000
	Hog	$90,000
	Bark Storage Bin & Discharge Conveyor	$145,000
	Ash Handling System	$36,000
	Thermal Oil	$60,000
	Total Heat Energy System	$2,451,000
Area 120	Maintenance, Office, Lab Equipment	
	Maintenance Shop Equipment	$80,000
	Lab Equipment	$75,000
	Office Equipment & Miscellaneous	$40,000
	Total Maintenance, Office, Lab Equipment	$195,000
Area 130	Electrical	
	25 kV Substation	$300,000
	600 V Switchgear	$225,000
	Motor Control Centers	$250,000
	Wire Cable & Conduit (Inc. With Installation)	-------
	PLC's Consoles (Inc. With Equipment)	-------
	Miscellaneous Electrical	$200,000

	Electrical Installation	$1,700,000
	Motors	
	(Inc. With Equipment)	-------
	Standby Diesel Generator Set	$480,000
	Total Electrical	$3,155,000
Area 140	Installation	
	Mechanical Equipment Installation	$2,060,000
	Dust Collection System	
	c/w Installation	$650,000
	Piping System Installation	$455,000
	Plant Compressed Air System	$140,000
	Piping & Equipment Insulation	$300,000
	Total Mechanical Installation	$3,605,000
Area 150	Manufacturers' Representatives	
	Total Manufacturers' Representatives	$308,000
Area 160	Spares	
	Spare Parts	$500,000

Area 170	Engineering & Project Management	
	Engineering	$1,500,000
	Construction & Project Management	$350,000
	Construction Office	$40,000
	Electricity	$10,000
	Office Supplies	$20,000
	Office Equipment	$15,000
	Telephone & Telex	$20,000
	Travel Expenses	$30,000
	Total Engineering and Project Management	$1,985,000

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5. Construction and Start-Up Schedule

Appendix 1 contains the project Engineering and Construction Bar Chart Schedule, listing the major events required for project completion in a timely fashion.

The schedule assumes that a project "go-ahead" decision is made on October 1, 1987. With this starting date, first board could be made on May 23, 1989 or approximately 20 months after the start date. Should the project proceed, a revised schedule would be produced, reflecting the actual start date.

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6. Production Cost Estimates

6.1 Direct Material

.1 Wood

Delivered Cost:	$25.97/m^3 ($60.00/Cd @ 2.31 m^3/Cd)
Consumption:	2.0 m^3 Wood/m^3 Production
Direct Wood Cost:	$51.95/m^3 Production = $45.98/MSF (3/8")

.2 Phenolic Resin

Delivered Cost:	$1.46/kg. ($.66/lb.)
Consumption:	1.075 x 641 x 0.025 = 17.23 kg/m^3

Where 1.075 is factor for trim and other losses.

Direct Resin Cost:	17.23 x $1.46 = $25.15/m^3 = $22.26/MSF (3/8")

.3 Wax

Delivered Cost:	$.44/kg ($.20/lb)
Consumption:	1.075 x 641 x 0.015 = 10.34 kg/m^3
Direct Wax Cost:	10.34 x $.44 = $4.55/m^3 = $4.03/MSF (3/8")

.4 Total Raw Material

Total Cost:	$81.65/m^3 = $72.27/MSF (3/8")

6.2 Labour Requirements

Position	Shift 1	Shift 2	Shift 3	Shift 4	Rate	Cost/Year	
Production Foreman	1	1	1	1	17.50	147,000
Scales & Security	1	1			11.00	46,200
Cat 980	1	1			11.60	48,720
Carry Lift	1	1	1	1	11.60	97,440
Wood Handling	1	1	1	1	11.60	97,440
Debarker/Flaker	2	2	2	2	11.60	194,880
Dryer/Heat Energy	2	2	2	2	11.60	194,880
Blending	1	1	1	1	11.60	97,440
Press	1	1	1	1	12.00	100,800
Trim & Grade & Storage	2	2	2	2	11.60	194,880
Fork Lift & Shipping	1	1			11.60	48,720
Knife Grinder	1	1			11.60	24,360
Clean Up	1	1	1	1	11.00	92,400
Maintenance						
Chief Electrician	1				17.00	35,700
Chief Mechanic	1				17.00	35,700
Electronic Tech	1				16.00	33,600
Electrician	1	1	1	1	16.00	134,400
App. Electrician		1	1	1	14.00	88,200
Welder	1	1			13.00	54,600
Machinist	1	1			14.00	58,800
Mechanic/Millwright	1	1	1	1	13.00	109,200
App. Mechanic	1	1	1	1	11.50	96,600
Carpenter	1				11.50	24,150
Sub Total	26	21	16	16		2,079,630

Overtime @ 7%	=	$ 145,574
Fringe @ 26%	=	$ 478,315
Total Labor Costs/Yr.	=	$2,703,519
Labor Cost/m^3	=	$ 22.14
Labor/MSF	=	$ 19.59

6.3 Miscellaneous and Incremental Maintenance

.1 Electrical Energy

Energy Consumption:	145 KWH/m^3
Average Energy Cost:	\$0.04/KWH
Direct Electrical Cost:	145 x 0.04
	= \$6.24/m^3
	= \$5.52/MSF (3/8")

.2 Shipping Materials

Spacer Blocks:	\$1.00/m^3
Strapping and Corners:	\$1.00/m^3
	\$2.00/m^3
	= \$1.77/MSF (3/8")

.3 Maintenance Materials

Spare Parts:	\$470,000
Fixed Equipment	\$530,000
Mobile Equipment	\$220,000
	\$1,220,000

Maintenance Materials Cost = \$10.00/m^3 \$8.85/MSF (3/8")

6.4 Production Cost Summary

Item	\$/m^3	\$/MSF (3/8")
Wood	\$ 51.95	\$45.98
Resin	25.15	22.26
Wax	4.55	4.03
Electricity	6.24	5.52
Shipping Materials	2.00	1.77
Maintenance	10.00	8.85
Labour	22.14	19.59
Total	\$122.03	\$108.00

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for

Northwestern New Brunswick

Department of Commerce and Technology

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7. Administration and Overhead Costs

7.1 Administration and Supervision

Administration and supervision costs are based on a fixed salary staff of 15 people to properly run the plant. This is based on the fact that all product marketing would be performed from the plant by a full time sales manager. The following table lists the supervisory staff along with their projected wages:

Administration Costs

Plant Manager	1	50,000
Sales Manager	1	46,000
Production Manager	1	41,000
Maintenance Superintendent	1	39,000
Quality Control Superintendent	1	35,000
Quality Control Tech.	4	80,000
Purchasing Agent	1	30,000
Shipping Foreman	1	31,000
Secretary-Clerks	3	42,000
Sales and Order Clerk	1	16,000
Sub Total	15	410,000
Fringe Benefits @ 20%		82,000
Sub Total		$492,000

7.2 Insurance

Insurance coverages for the plant will be as follows:

Insurance Type		Rate (Est.)	Cost
a.	Fire Insurance	$.20/$100 value	$40,000
b.	Business Interruption	$.20/$100 value	40,000
c.	Comprehensive General Liability inc. Product Liability	Est.	25,000
d.	Auto Insurance		$2,000
		Est. Total	$107,000
		USE	$125,000/yr.

Warehouse inventory would be covered under the same policy and rates as that for buildings and equipment. Assuming a 100 ft. spacing between the log storage area and the building, the rate may be 50% of that for buildings and equipment.

Insurance rates are based on 1987 rate levels and may vary due to variations in the insurance market.

7.3 Property Taxes

Discussions with the New Brunswick Tax Assessment Branch in Fredericton indicated that for a pre-engineered steel building of the type under consideration and with an area of approximately 125,000 ft^2, the expected yearly municipal taxes would amount to between $100,000 and $125,000/yr. Use $125,000/yr.

7.4 Office and Miscellaneous Expenses

Following is a summary of the estimated office and miscellaneous overhead expenses that the new plant will encounter. Note that property taxes and insurance discussed above are included in the list.

Office and Miscellaneous Overheads

Telephone and Telex	$ 13,000
Heat Light and A/C	5,500
Travel and Living - General	30,000
Sales Travel and Living	75,000
Advertising and Promotion (Allow)	50,000
Supplies and Miscellaneous	18,000
Legal and Audit	50,000
Fixed Maintenance Expense	60,000
Insurance and Taxes	250,000
Security and Contingencies	71,000
Total Admin. and Overhead	$622,500

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Detailed Feasibility Study - Phase III

Waferboard/OSB Plant

for

Northwestern New Brunswick

Department of Commerce and Technology

Job No. 3961

8. Preproduction Expenses

Preproduction expenses cover a number of costs that will be incurred by the plant as it evolves from a construction project to a efficient operating plant system. These costs include, but may not be limited, to the following items:

Item	Estimate	Basis
Dryer/Heat Energy Start Up Fuel Oil	$ 30,000	(80 hrs Cont. Oper.)
Electric Power	30,000	(15 days Equiv. Prod.)
Wood, Resin & Wax Misc.	55,000	(3 days Equiv. Prod.)
Labour Training Salaries (Pre-production)	225,000	(1 month)
TOTAL:	340,000	

The preproduction expense estimate of $340,000 is included in the return on investment calculation as a factory overhead cost in Table III.

Production rates have been conservatively estimated for the first two years to allow ample time for fine tuning of the plant, and unexpected equipment deficiencies.

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Detailed Feasibility Study - Phase III

Waferboard/OSB Plant

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9. Working Capital Requirements

Working capital requirements for the new plant at full production rates are based on the following assumptions for receivables and inventory:

Item	Capital Requirement
Receivables	30 Days Production
Wood Inventory	90 Days Inventory
Resin Inventory	14 Days Inventory
Wax Inventory	14 Days Inventory
Warehouse Inventory	14 Days Inventory
Maximum Working Capital Required:	$ 3,097,000

Accounts payable are based on net 30 days with the exception of wood and transportation charges which are on a cash basis.

Initially a portion of the working capital requirement would be supplied by a demand loan to be paid off after the second year of production. From this point on, working capital would be obtained from plant cash flow.

However, with the plant under consideration the potential small cash flow margin available may necessitate continued demand loan financing, simply to keep the plant in operation.

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Detailed Feasibility Study - Phase III

Waferboard/OSB Plant

for

Northwestern New Brunswick

Department of Commerce and Technology

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10. Financial Plan

10.1 Cash Requirements

The cash requirement for construction and initial operation of the plant was determined using the financial model and assumptions noted below. Following is a summary of the cash requirement sources as assumed:

Source	Amount
Owner's Equity	$10,000,000
Federal Interest Free Loans	$10,000,000
Term Bank Loans	$19,100,000
Demand Loan (First Year)	$ 2,819,277
Total	$41,819,277

In addition to the above, an investment tax credit cash refund of approximately $6,700,000 is expected.

The above total includes construction costs of $42,000,000 and the balance going towards operating start-up costs.

10.2 Funding Sources

Government funding is expected to take the form of three programs.

a) Interest free loans @ 25% of capital cost.
b) Atlantic Enterprise Program (AEP) interest buy downs to 6% annually for first 7 years of term.
c) Investment Tax Credit Cash Refund program based on 40% of 40% of eligible investments, within the first two years.

No other government funding is assumed in the financial analysis.

10.3 Financial Model Assumptions

The financial plan, return on investment (ROI) analysis, and total dollar requirement to get the plant operational resulted from the capital cost estimates, operating cost estimates and in addition, the following assumptions.

1. Capital cost estimates were based on 1987 Canadian dollars.
2. Interest rate for borrowed money at 11% per annum, after the first 7 years of operation at 6% under AEP.
3. Depreciation rates for buildings and equipment are taken at their maximum rates below for income tax calculations:

Year	First	Second	Subsequent	Method
Buildings	2%	4%	4%	Declining Balance
Site Improvement	4%	8%	8%	Declining Balance
Production Equipment	12-1/2%	25%	25%	Declining Balance
Office Equipment	10%	20%	20%	Declining Balance
Mobile Equipment	15%	30%	30%	Declining Balance

4. The depreciation base for income tax purposes has been reduced by the amounts of the Investment Tax Credit.
5. Investment Tax Credits have been amortized over 10 years after the plant begins operation (if used).
6. DCFROI is calculated on an after tax basis on the net cash generated in each year in excess of a minimum cash balance of $10,000.
7. The full equity investment is put into the project in the first year.
8. Current and deferred income taxes are calculated based on first using all losses carried forward from previous years operations, then taking advantage of the maximum capital cost allowances under the Income Tax Act followed by utilization of the Investment Tax Credits.
9. Project financing is assumed on an approximate 25% Owners equity with the remainder at 25% Government IF loans and 50% Bank Term Loans.

10. Interest free loans are assumed to be available as necessary during construction, after the Owners equity funds are committed.

11. A ten year term bank loan is used for debt financing. AEP interest buy downs to 6% annually for the first 7 years of full operation are assumed with the balance of the term being financed at 11% annually.

12. A demand loan limited to a maximum of 50% of current assets is used as required to provide additional working capital requirements and for bridge financing. This would be secured by receivables and inventory.

13. Working capital requirements assume Receivables at 30 days, Inventory for raw materials other than wood and for finished goods at 14 days, wood inventory at 90 days. Accounts payable are assumed at 30 days except for wood and transportation which are on a cash basis.

14. Labour costs of production are based on expected rates for the North West New Brunswick area and include a 7% overtime premium in their calculation.

15. Production rates as a percentage of full production for the operating period are assumed as follows:

First year:	50% (4 months)
Second year:	80% (12 months)
Third year:	90% (12 months)
Fourth year:	100% (12 months)

16. Inflation of production costs and escalation of sales prices over the 17 year plant operating period are not included since it is assumed that these factors would increase proportionately. This will give a conservative estimate of the internal rate of return on investment unless costs rise more rapidly than sales price.
17. Income taxes payable are calculated at 20% on the first $200,000 of profit and 44.5% on anything over $200,000.
18. An investment tax credit of 40% has been assumed on the capital cost of the project less $200,000 for ineligible items. Cash returns of 40% of the un-used investment tax credit are included for the first two years.
19. The life of the project has been assumed at 15 full operating years. Zero salvage value has been assumed and all working capital is returned to cash in the seventeenth year.
20. The mill net sales price used was $154.49/MSF (3/8" basis), over the plant life.

10.4 Pro-Forma Financial Statements and ROI Analysis

MGM INTERNATIONAL

13BMMSF/YR(3/8") OSB PLANT

DEPT. OF COMMERCE & TECHNOLOGY, NEW BRUNSWICK

JOB NO.: 3961
DATE: OCT.7/87, REV.6
BY: JRB

TABLE I

CONSTRUCTION COST SUMMARY

010	SITE AND SITE DEVELOPMENT	$ 1081000
020	BUILDINGS AND STRUCTURES	$ 8045000
030	MOBILE EQUIPMENT	$ 600000
040	WOOD HANDLING	$ 1000000
050	FLAKING AND WET STORAGE	$ 1345000
060	DRYING	$ 1901000
070	STORAGE AND BLENDING	$ 1490000
080	FORMING EQUIPMENT	$ 1450000
090	PRESSING EQUIPMENT	$ 5720000
100	TRIM,GRADE AND STRAPPING	$ 1100000
110	HEAT ENERGY SYSTEM	$ 2451000
120	MAINTENANCE, OFFICE AND LAB EQUIPMENT	$ 195000
130	ELECTRICAL EQUIPMENT AND INSTALLATION	$ 3155000
140	MECHANICAL EQUIPMENT INSTALLATION	$ 3605000
150	MANUFACTURER'S REPRESENTATIVES	$ 300000
160	SPARE PARTS	$ 500000
170	ENGINEERING AND PROJECT MANAGEMENT	$ 1985000
180	CONTINGENCY @ 0.10	$ 3601100
	SUB TOTAL	$39612100
190	ESCALATION @ 0.05	$ 1980550
200	INTEREST DURING CONSTRUCTION	$ 419603
	TOTAL	$41832253
	USE	$42000000

AEP RATE 6.00 %
NORMAL 11.00 %

INTEREST DURING CONSTRUCTION CALCULATION

MONTH	% EXPEND.	EXPEND	EQ.&IFL	GRANT	LOAN	INTEREST
1	1	414127	414127		0	
2	1	414127	414127		0	0
3	5	2070633	2070633		0	0
4	4	1656506	1656506		0	0
5	4	1656506	1656506		0	0
6	4	1656506	1656506		0	0
7	5	2070633	2070633		0	0
8	5	2070633	2070633		0	0
9	5	2070633	2070633		0	0
10	6	2484759	2484759	0	0	0
11	6	2484759	2484759		0	0
12	6	2484759	950181		1534578	0
SUBTOTAL	52					
13	6	2484759	0		2484759	7673
14	6	2484759	0		2484759	28097
15	6	2484759	0		2484759	32520
16	6	2484759	0		2484759	44944
17	7	2898886	0		2898886	57368
18	7	2898886	0	0	2898886	71862
19	6	2484759	0		2484759	86357
20	3	1242380	0	0	1242380	99781
SUBTOTAL	99					
21						
22						
23	1	414127			414127	
24						
25				0		
INTEREST DURING CONSTRUCTION						$ 419603
TOTALS		41412650	28000000		21412650	

MAXIMUM CAPITAL COST ALLOWANCE

YEAR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
BUILDINGS	160980	315364	302749	290639	279014	267853	257139	246854	236979	227500	218400	209664	201278	193227	185498	178078	
PROD.EQUIP.	3936456	6888798	5166599	3874949	2906212	2179659	1634744	1226058	919544	689658	517243	387932	290949	218212	163659	122744	
SITE IMPROVEMENTS	43240	83021	76379	70269	64647	59476	54717	50340	46313	42608	39199	36063	33178	30524	28082	25835	
OFFICE EQUIPMENT	19500	35100	29060	22464	17971	14377	11502	9201	7361	5889	4711	3769	3015	2412	1930	1544	
MOBILE EQUIPMENT	90000	153000	107100	74970	52479	36735	25715	18000	12600	8820	6174	4322	3025	2118	1482	1038	
MAX. TOTAL DEPREC.	3825887	6727755	5112817	3899962	2988291	2382298	1785435	1395488	1180517	877827	787155	577576	478381	401843	342586	296315	32818365
BOOK DEPRECIATION ALLOWANCE																	
BUILDINGS AND SITE	215825	645876	645876	645876	645876	645876	645876	645876	645876	645876	645876	645876	645876	645876	645876	430050	
PLANT AND EQUIP.	1056257	3168770	3168770	3168770	3168770	3168770	3168770	3168770	3168770	3168770	2112513						
MOBILE EQUIP.	42411	127234	127234	127234	127234	84823											
TOTAL	1313693	3941879	3941879	3941879	3941879	3898868	3813845	3813845	3813845	3813845	2757589	645876	645876	645876	645876	430050	42000000
AMORT.GOVT.GRANT & ITC	558667	1676000	1676000	1676000	1676000	1676000	1676000	1676000	1676000	1676000	1117333						

NGH INTERNATIONAL

138MMSF/YR(3/8") OSB PLANT

DEPT. OF COMMERCE & TECHNOLOGY, NEW BRUNSWICK

JOB NO.: 3961
DATE: OCT.7/87, REV.6
BY: JRB

TABLE 1.0A

FINANCIAL PLAN

EQUITY FUNDS	$ 10000000
INTEREST FREE LOAN	$ 10000000
SUB TOTAL	$ 20000000
PROVINCIAL GRANT	$ 0
TERM BANK LOANS	$ 19000000
DEMAND LOAN	$ 2819231
TOTAL	$ 41819231

TABLE II

OPERATING AND MAINTENANCE LABOR COSTS

POSITION	SHIFT 1	SHIFT 2	SHIFT 3	SHIFT 4	RATE	COST/YEAR
PRODUCTION						
FOREMAN	1	1	1	1	17.50	147000
SCALES & SECURITY	1	1			11.00	46200
CAT 950	1	1			11.60	48720
CARRY LIFT	1	1	1	1	11.60	97440
DEBARKER	1	1	1	1	11.60	97440
WOOD HANDLING	1	1	1	1	11.60	97440
SLASHER DECK	0	0	0	0	11.60	0
WAFERIZER	1	1	1	1	11.60	97440
DRYER & HEAT ENERG	2	2	2	2	11.60	194880
PRESS	1	1	1	1	12.00	100800
TRIM & GRADE	1	1	1	1	11.60	97440
STRAP & FORK LIFT	1	1	1	1	11.60	97440
SHIPPING	1	1	0	0	11.60	48720
BLENDING	1	1	1	1	11.60	97440
KNIFE GRINDER	1	0			11.60	24360
CLEANUP	1	1	1	1	11.00	92400
MAINTENANCE						
DRAFTSMAN	0				11.00	0
CHIEF ELECTRICIAN	1				17.00	35700
CHIEF MECHANIC	1				17.00	35700
ELECTRONICS	1				16.00	33600
ELECTRICIAN	1	1	1	1	16.00	134400
APP.ELECTRICIAN		1	1	1	14.00	88200
WELDER	1	1			13.00	54600
MACHINIST	1	1			14.00	58800
MILLWRIGHT	1	1	1	1	13.00	109200
APP.MILLWRIGHT	1	1	1	1	11.50	96600
GRADER	0				11.00	0
CARPENTER	1				11.50	24150
MESSENGER	0				9.60	0
CHIEF FILER	0				12.00	0
KNIFE FILER		0			11.00	0
SAW FILER			0		11.00	0
AUTO MECHANIC	1				11.00	23520
SUBTOTAL	29	21	19	19		2079630
TOTAL OPERATING &		OVERTIME PREMIUM @			0.070	145574
MAINTENANCE STAFF	79	FRINGE BENEFITS @			0.230	478315
TOTAL LABOUR COSTS PER YEAR						$ 2703519

NEW INTERNATIONAL

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DEPT. OF COMMERCE & TECHNOLOGY, NEW BRUNSWICK

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TABLE III

PROFORMA SCHEDULE OF MANUFACTURING COSTS

YEAR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
PRODUCTION-MMSF-3/8"	0	23	110	125	138	138	138	138	138	138	138	138	138	138	138	138	138	
-sq.m.x1000	0	20	97	111	122	122	122	122	122	122	122	122	122	122	122	122	122	
CONS. PRICE INDEX	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
COST MULTIPLIER	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
COST OF SALES																		
DIRECT LABOR -$x1000		742	2225	2225	2225	2225	2225	2225	2225	2225	2225	2225	2225	2225	2225	2225	2225	
LABOR BENEFITS -$x1000		159	478	478	478	478	478	478	478	478	478	478	478	478	478	478	478	
TOTAL DIRECT LABOR -$x1000		901	2704	2704	2704	2704	2704	2704	2704	2704	2704	2704	2704	2704	2704	2704	2704	
DIRECT MATERIALS -$x1000		1828	8345	9831	9978	9978	9978	9978	9978	9978	9978	9978	9978	9978	9978	9978	9978	
FACTORY OVERHEAD																		
POWER,LIGHT & HEAT -$x1000		140	637	698	761	761	761	761	761	761	761	761	761	761	761	761	761	
REPAIRS & MAINT. -$x1000		284	973	1186	1221	1221	1221	1221	1221	1221	1221	1221	1221	1221	1221	1221	1221	
PACKING MATERIALS -$x1000		41	195	221	244	244	244	244	244	244	244	244	244	244	244	244	244	
PREPRODUCTION EXP. -$x1000		348																
DEPR.PLANT & EQUIP -$x1000		1899	3296	3296	3296	3296	3254	3169	3169	3169	3169	2113	0	0	0	0	0	
AMORT.GOV'T GRANT -$x1000		-559	-1676	-1676	-1676	-1676	-1676	-1676	-1676	-1676	-1676	-1117	0	0	0	0	0	
TOTAL MANUF. COST -$x1000		3993	14474	15372	16521	16521	16478	16394	16394	16394	16394	15896	14981	14981	14981	14981	14981	

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TABLE IV

PROFORMA SELLING AND ADMINISTRATIVE EXPENSES

YEAR		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
PRODUCTION-MMSF-3/8"		0	23	110	125	138	138	138	138	138	138	138	138	138	138	138	138	138
-MSF-1000		0	20	97	111	122	122	122	122	122	122	122	122	122	122	122	122	122
CONS. PRICE INDEX		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
COST MULTIPLIER		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SALES PRICE INCREASE				0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.052
SALES PRICE	-$/MSF		184	184	184	184	184	184	184	184	184	184	184	184	184	184	184	184
DISCOUNTS & DUTY	-$/MSF	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
TRANSPORTATION	-$/MSF	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23
MILL NET PRICE	-$/MSF		154	154	154	154	154	154	154	154	154	154	154	154	154	154	154	154
SALES	-$x1000	0	4147	19833	22538	24881	24881	24881	24881	24881	24881	24881	24881	24881	24881	24881	24881	24881
SELLING EXPENSE																		
DISCOUNTS & DUTY	-$x1000		142	608	773	853	853	853	853	853	853	853	853	853	853	853	853	853
SALARIES	-$x1000		25	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62
EMPLOYEE BENEFITS	-$x1000		5	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
ADVERTISING	-$x1000		20	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
TWA DUES	-$x1000		5	36	41	46	46	46	46	46	46	46	46	46	46	46	46	46
TRAVELLING	-$x1000		30	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75
TRANSPORTATION	-$x1000		536	2564	2914	3217	3217	3217	3217	3217	3217	3217	3217	3217	3217	3217	3217	3217
TOTAL	-$x1000		763	3408	3927	4315	4315	4315	4315	4315	4315	4315	4315	4315	4315	4315	4315	4315
ADMINISTRATIVE EXPENSE																		
SALARIES	-$x1000		154	348	348	348	348	348	348	348	348	348	348	348	348	348	348	348
EMPLOYEE BENEFITS	-$x1000		31	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
TRAVELLING	-$x1000		12	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
INSURANCE & TAXES	-$x1000		100	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250
FIXED MAINTENANCE	-$x1000		24	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
TELEPHONE & TELEX	-$x1000		5	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
HEAT,LIGHT & A/C	-$x1000		2	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
SUPPLIES AND MISC.	-$x1000		7	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
LEGAL AND AUDIT	-$x1000		20	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
BAD DEBTS	-$x1000		21	99	113	124	124	124	124	124	124	124	124	124	124	124	124	124
BANK CHG.& SUNDRY	-$x1000		30	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75
DEPR. OF BUILDINGS	-$x1000		215	645	645	645	645	645	645	645	645	645	645	645	645	645	430	
TOTAL	-$x1000		621	1663	1677	1689	1689	1689	1689	1689	1689	1689	1689	1689	1689	1689	1474	
FINANCIAL EXPENSE CALCULATION																		
DEMAND LOAN-START	-$x1000	0	0	2819	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEMAND LOAN-END	-$x1000	0	2819	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TERM LOAN-START	-$x1000	0	1535	19000	19000	17100	15200	13300	11400	9500	7600	5700	3800	1900	0	0	0	0
TERM LOAN-END	-$x1000	1535	19000	19000	17100	15200	13300	11400	9500	7600	5700	3800	1900	0	0	0	0	0
TOTAL LOAN-START	-$x1000	0	1535	21819	19000	17100	15200	13300	11400	9500	7600	5700	3800	1900	0	0	0	0
TOTAL LOAN-END	-$x1000	1535	21819	19000	17100	15200	13300	11400	9500	7600	5700	3800	1900	0	0	0	0	0
INTEREST	-$x1000	46	234	1225	1083	969	855	741	627	941	732	523	314	105	0	0	0	0

NGM INTERNATIONAL

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DEPT. OF COMMERCE & TECHNOLOGY, NEW BRUNSWICK

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TABLE V

PROFORMA STATEMENT OF REVENUE AND EXPENSES

YEAR		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
PRODUCTION-MMSF-3/8"		0	23	110	125	138	138	138	138	138	138	138	138	138	138	138	138	138
-m3x1000		0	20	97	111	122	122	122	122	122	122	122	122	122	122	122	122	122
SALES	-$x1000	0	4147	19833	22538	24881	24881	24881	24881	24881	24881	24881	24881	24881	24881	24881	24881	24881
COST OF SALES	-$x1000	0	3993	14474	15372	16521	16521	16478	16394	16394	16394	16394	15896	14981	14981	14981	14981	14981
GROSS MARGIN	-$x1000	0	154	5359	7166	8361	8361	8403	8488	8488	8488	8488	8986	9981	9981	9981	9981	9981
SELLING EXPENSE	-$x1000	0	763	3488	3927	4315	4315	4315	4315	4315	4315	4315	4315	4315	4315	4315	4315	4315
ADMIN. EXPENSE	-$x1000	0	621	1663	1677	1689	1689	1689	1689	1689	1689	1689	1689	1689	1689	1689	1689	1474
FINANCIAL EXP.	-$x1000		234	1225	1883	969	855	741	627	941	732	523	314	105	0	0	0	0
EARNINGS PRETAX	-$x1000	0	-1464	-1888	479	1389	1583	1659	1858	1544	1753	1962	2669	3873	3978	3978	3978	4193
INCOME TAXES																		
CURRENT	-$x1000	0	0	0	0	0	0	0	0	0	0	62	1554	1705	1795	1829	1856	1876
DEFERRED	-$x1000	0	0	0	164	569	620	689	778	638	731	762	-415	-38	-74	-108	-135	-60
EARNINGS	-$x1000	0	-1464	-1888	315	820	883	970	1080	906	1022	1138	1530	2199	2257	2257	2257	2376
NET EARNINGS	-$x1000	0	-1464	-1888	315	820	883	970	1080	906	1022	1138	1530	2199	2257	2257	2257	2376

NGM INTERNATIONAL

138MMSF/YR(3/8") OSB PLANT

DEPT.OF COMMERCE & TECHNOLOGY,NEW BRUNSWICK

JOB NO.: 3961
DATE: OCT.7/87,REV.6
BY: JRB

TABLE VI

CHANGES IN FINANCIAL POSITION

YEAR		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
SOURCE OF FUNDS																		
EARNINGS	-$x1000	0	-1464	-1088	315	828	883	978	1080	986	1022	1138	1538	2199	2257	2257	2257	2376
DEPRECIATION	-$x1000	0	1314	3941	3941	3941	3941	3899	3814	3814	3814	3814	2758	645	645	645	645	438
AMORT.GOVT.AID	-$x1000	0	-559	-1676	-1676	-1676	-1676	-1676	-1676	-1676	-1676	-1676	-1117	0	0	0	0	0
DEFERRED TAXES	-$x1000	0	0	0	164	569	628	689	778	638	731	762	-415	-30	-74	-188	-135	-60
FUNDS FROM OPER.	-$x1000	0	-709	1257	2744	3654	3768	3882	3996	3682	3891	4038	2755	2814	2827	2793	2767	2746
INT. FREE LOAN	-$x1000	10000																
INV. TAX CREDIT	-$x1000	3438	3274	0	0	0	0	0	10056	0	0	0	0	0	0	0	0	0
PROV. GRANT	-$x1000	0	0															
LONG TERM LOAN	-$x1000	1535	17465	0														
ISSUE OF SHARES	-$x1000	10000																
TOTAL	-$x1000	24964	28031	1257	2744	3654	3768	3882	14052	3682	3891	4038	2755	2814	2827	2793	2767	2746
APPLICATION OF FUNDS																		
FIXED ASSETS	-$x1000	21535	28465															
TERM LOAN INSTAL.	-$x1000			1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	0	0	0	0	0
I.F.LOAN PAYMENT	-$x1000					2000	2000	2000	2000	2000								
TOTAL	-$x1000	21535	28465	1900	1900	3900	3900	3900	3900	3900	1900	1900	1900	0	0	0	0	0
INCREASE IN FUNDS		3438	-434	-643	844	-246	-132	-18	10152	-218	1991	2138	855	2814	2827	2793	2767	2746
WORKING CAPITAL-START			3438	2995	2352	3196	2950	2818	2799	12951	12733	14724	16862	17717	20531	23358	26152	28919
WORKING CAPITAL-END		3438	2995	2352	3196	2950	2818	2799	12951	12733	14724	16862	17717	20531	23358	26152	28919	31665

NGH INTERNATIONAL

138MMSF/YR(3/8") OSB PLANT

DEPT. OF COMMERCE & TECHNOLOGY, NEW BRUNSWICK

JOB NO.: 3961
DATE: OCT.7/87, REV.6
BY: JRB

TABLE 3.1

DIRECT MATERIALS AND SERVICES COSTS

ITEM	COST/UNIT	UNIT	USEAGE/m3	COST/m3
WOOD	25.97	m3	2.00	51.95
RESIN	1.46	kg	17.23	25.15
WAX	0.44	kg	10.34	4.55
ELECTRICITY	0.04	kwh	145.00	6.24
HEAT ENERGY	0.00			0.00
PACKAGING MATERIAL				2.00
SUPPLIES & MAINT.				10.00
TOTAL DIRECT MATERIALS AND SERVICE COSTS				99.88

FRINGE BENEFITS	%
VACATION	3.00
SICK LEAVE	1.50
GROUP INSURANCE	4.00
COMPANY PENSION	8.00
CPP	1.90
U.I.C.	3.40
	0.30
WORKMEN'S COMP.	8.00
TOTAL	22.60
USE	23

TABLE VII

ADMINISTRATION AND OVERHEAD COSTS

PLANT MANAGER	1	50000
SALES MANAGER	1	46000
PRODUCTION MANAGER	1	41000
MAINTENANCE SUPERINTENDENT	1	39000
QUALITY CONTROL SUPERINTENDENT	1	35000
QUALITY CONTROL TECH.	4	80000
PURCHASING	1	30000
PLANT ENGINEER	0	0
SHIPPING FOREMAN	1	31000
SECRETARY-CLERKS	3	42000
SALES AND ORDER CLERK	1	16000
SUB TOTAL	15	410000
FRINGE BENEFITS @ 20 %		82000
SUB TOTAL		$ 492000
OFFICE EXPENSE		
TELEPHONE AND TELEX		13000
HEAT, LIGHT AND A/C		5500
TRAVEL AND LIVING - GENERAL		30000
SALES, TRAVEL AND LIVING		75000
ADVERTISING AND PROMOTION (ALLOW)		50000
SUPPLIES AND MISCELLANEOUS		18000
LEGAL AND AUDIT		$ 50000
SUB TOTAL		$ 241500
TOTAL ADMIN. & OFFICE EXP.		$ 733500
INSURANCE AND TAXES		$ 250000
SUMMARY OF FIXED CASH ANNUAL OVERHEADS		
ADMINISTRATION AND OFFICE EXPENSE		$ 733500
FIXED MAINTENANCE EXPENSE		$ 60000
INSURANCE AND TAXES		$ 250000
SECURITY AND CONTINGENCIES		$ 71000
TOTAL ADMIN. AND OVERHEAD		$ 1114500

NGM INTERNATIONAL

138MMSF/YR(3/8") OSB PLANT

DEPT. OF COMMERCE & TECHNOLOGY, NEW BRUNSWICK

JOB NO.: 3961
DATE: OCT. 7/87, REV. 6
BY: JRB

TABLE VIII

CURRENT AND DEFERRED TAX CALCULATION

YEAR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
EARNINGS PRETAX -0x1000	0	-1464	-1000	479	1389	1583	1659	1858	1544	1753	1962	2669	3873	3978	3978	3978	4193
TAX PAYABLE		0	0	164	569	620	689	778	638	731	824	1139	1675	1721	1721	1721	1817
DEPRECIATION ALLOWANCE	0	1314	3941	3941	3941	3941	3899	3814	3814	3814	3814	2758	645	645	645	645	438
AMORT. GOV'T GRANT & ITC	0	-559	-1676	-1676	-1676	-1676	-1676	-1676	-1676	-1676	-1676	-1117	0	0	0	0	0
MAX. CAPITAL COST ALLOWANCE	0	3825	6728	5113	3988	2988	2382	1765	1395	1181	877	787	578	478	482	343	296
CORR. TAXABLE INCOME		-4534	-5471	-2369	-246	779	1579	2210	2287	2791	3223	3682	3941	4144	4221	4288	4326
LOSS CARRY FWD	0	-4534	-10005	-12373	-12620	-11840	-10261	-8051	-5764	-2973	0	0	0	0	0	0	0
CURRENT TAXABLE INCOME		-4534	-10005	-12373	-12620	-11840	-10261	-8051	-5764	-2973	250	3682	3941	4144	4221	4288	4326
CORRECTED TAX PAYABLE		0	0	0	0	0	0	0	0	0	62	1554	1785	1795	1829	1856	1876
INVEST. TAX CREDIT AVBL.	8574	13338	18056	18056	18056	18056	18056	18056	0	0	0	0	0	0	0	0	0
INVEST. TAX CREDIT USED	3438	3274	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CURRENT TAX PAYABLE	0	0	0	0	0	0	0	0	0	0	62	1554	1785	1795	1829	1856	1876
DEFERRED TAXES	0	0	0	164	569	620	689	778	638	731	762	-415	-38	-74	-108	-135	-60

NGM INTERNATIONAL

138MMSF/YR(3/8") OSB PLANT

DEPT.OF COMMERCE & TECHNOLOGY,NEW BRUNSWICK

JOB NO.: 3961
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BY: JRB

TABLE IX

BALANCE SHEET

YEAR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
CURRENT ASSETS																	
CASH	2485	10	1677	2380	4085	3955	3940	14092	13874	13865	16824	16920	17834	20661	23455	26222	31662
ACCTS. RECV.& INV.	0	2591	2854	3097	3097	3095	3092	3092	3092	3092	3071	3829	3829	3829	3829	3829	335
INV. TAX CREDIT RECVBL.	3438	3274	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GRANT RECEIVABLE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL CURNT. ASSET	5914	5875	4530	5397	7182	7050	7032	17183	16965	16956	19894	19950	20863	23691	26484	29251	31998
INV. TAX CREDIT DEFF.	13338	10056	10056	10056	10056	10056	10056	0	0	0	0	0	0	0	0	0	0
DEFF. GRANT RECEIV.	0																
FIXED ASSETS																	
PLANT AND EQUIP.	21535	42000	42000	42000	42000	42000	42000	42000	42000	42000	42000	42000	42000	42000	42000	42000	42000
DEPRECIATION	0	1314	5255	9196	13137	17078	20977	24791	28604	32418	36232	38990	39635	40250	40925	41570	42000
TOTAL FIXED ASSETS	21535	40686	36745	32804	28863	24922	21023	17209	13396	9582	5768	3010	2365	1720	1075	430	0
TOTAL ASSETS	40779	56618	51332	48257	46101	42028	38111	34393	30361	26538	24862	22960	23229	25411	27559	29681	31998
CURRENT LIABILITIES																	
ACCTS. PAYABLE	2485	61	278	381	332	332	332	332	332	332	332	332	332	332	332	332	332
TERM & INT LOAN PAYMENT			1900	1900	3900	3900	3900	3900	3900	1900	1900	1900	0	0	0	0	0
DEMAND LOAN PAYABLE	0	2819	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL CURRENT LIAB	2485	2880	2178	2281	4232	4232	4232	4232	4232	2232	2232	2232	332	332	332	332	332
FIXED LIABILITIES																	
TERM BANK LOAN	1535	19000	17100	15200	13300	11400	9500	7600	5700	3800	1900	0	0	0	0	0	0
INT. FREE LOAN	10000	10000	10000	10000	8000	6000	4000	2000	0	0	0	0	0	0	0	0	0
DEFERRED GOVT. ASST.	16760	16760	16760	16760	16760	16760	16760	16760	16760	16760	16760	16760	16760	16760	16760	16760	16760
AMORT.GOVT.GRANT & ITC		559	2235	3911	5587	7263	8939	10615	12291	13967	15643	16760	16760	16760	16760	16760	16760
NET GOVT. ASST.	16760	16201	14525	12849	11173	9497	7821	6145	4469	2793	1117	0	0	0	0	0	0
DEFERRED TAXES	0	0	0	164	733	1353	2042	2820	3458	4189	4951	4536	4586	4432	4324	4189	4129
CAPITAL STOCK	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000
RETAINED EARNINGS	0	-1464	-2472	-2157	-1337	-455	515	1595	2581	3523	4661	6192	8398	12647	12983	15160	17536
TOTAL LIABILITIES	40779	56618	51332	48257	46101	42028	38111	34393	30361	26538	24862	22960	23229	25411	27559	29681	31998
WORKING CAPITAL	3438	2995	2352	3196	2950	2818	2799	12951	12733	14724	16862	17717	20531	23358	26152	28919	31665
EQUITY CASH FLOW	-10000	0	1667	624	1785	-131	-15	10152	-218	-9	2159	897	914	2827	2793	2767	5188
DCFROI	8.134																
	0																

10.5 Mill Net Sales Price Calculation

The mill net sales price is defined as the board sales price, leaving the plant. Any transportation costs, distribution costs, duties or additional costs incurred in selling the board must be added to the mill net price to obtain the sales price.

This price is based on current OSB pricing as listed in trade periodicals and is an overall "weighted" average, based on estimated production thickness runs.

Waferboard/OSB Sales Prices
(As of Spetember 4, 1987)

Note:

1. Prices FOB, US Funds, Freight included for shipment to US destinations (if applicable).
2. Prices are /MSF 1/16" (equivalent basis).

Thickness	North East	Niagara	Estimated Production	Average	Weight Average
1/4"	25.75	27.50	10%	26.63	2.66
3/8"	23.00	23.33	5%	23.17	1.16
7/16"	22.29	22.00	50%	22.15	11.08
1/2"	22.50	22.25	5%	22.38	1.12
5/8" T&G	23.70	24.00	15%	23.85	3.58
3/4" T&G	23.33	25.00	15%	24.17	3.63
				23.73	23.73

Weighted Overall Average = $23.23/MSF (1/16")

Approximate Equivalent 3/8" Price = 6 x $23.23
= $139.38 US

Mill Net Sales Price = $\frac{(\$139.38 \times 1.32) - 23.31)}{1.04}$

@ $23.31 Shipping/MSF 3/8
4% Duty, 1.32 US/Can Conv. = $154.49 Can.
FOB Mill

NGM INTERNATIONAL

Detailed Feasibility Study - Phase III

Waferboard/OSB Plant

for

Northwestern New Brunswick

Department of Commerce and Technology

Job No. 3961

11. Sensitivity Analysis

The estimates and assumptions contained in this report are believed to accurately reflect various parameters under which the proposed plant would be built and operated. Some of the major areas considered were:

a. Capital construction costs,
b. Operating costs,
c. Financing arrangements, and
d. Sales pricing.

All of these items are very important when considering plant viability.

As with any industrial project, there are a number of risks which should be considered prior to going ahead with construction. These risks have been simulated with the economic analysis model and the results noted below.

Some of the major risks to be considered are:

11.1 Project Construction Cost Overruns

The estimates are reasonable, based on NGM's experience in construction of these types of plants. However, cost overruns are always a possiblity. By varying the capital cost of the plant only, the potential effects on the DCFROI have been calculated as follows:

Capital Cost	DCFROI
10% Under Estimate	14.4%
5% Under Estimate	14.1%
Estimated Cost	13.4%
5% Above Estimate	12.3%
10% Above Estimate	11.6%

It can be seen that the DCFROI varies inversely with the project capital cost although the overall effects on plant profitability are relatively small. A ten percent increase in capital costs gives about a 13 percent change in DCFROI.

11.2 Lack of Raw Material

A detailed investigation is highly recommended into the availability of the wood resource, prior to any decision to proceed with plant construction. Wood availability as described in "The Study of Utilization of Surplus Hardwood Resources for New Brunswick" by Neill and Gunter Limited, in 1985, coupled with recent increases in hardwood utilization in Region 5 seem to indicate a shortcoming of raw wood material.

11.3 Severe Price Competition

This is the largest risk of the operation. Since all, or most all of the production is destined for the US market, as a commodity, prices are highly subject to fluctuation due to market over-supply. In addition, major increases in US import duties for OSB may occur in the interest of protection of American OSB mill sales.

The effects on the DCFROI by varying the mill sales price are shown below:

Board Sales Price	DCFROI
10% Above Current Rate	29.8%
Base	13.4%
5% Below Current Rate	3.9%
10% Below Current Rate	No Return

As may be expected, the board sales price has a profound effect on the profitability of the plant. A five percent reduction in sales price gives about 70 percent reduction in DCFROI.

11.4 Low Production Output

The technology associated with the design and construction of modern SCB plants is well developed and the chance of the plant not producing at annual design levels is low. However, equipment operation and labour problems could combine to give outputs lower than those estimated.

The effects on the plant DCFROI variations in the annual production levels have been modeled as follows:

Plant Production	DCFROI
+5% (Early Start-Up)	16.4%
Base Design	13.4%
-5% (Below)	10.3%
-10% (Below)	6.6%

The production rates have a large effect on the DCFROI, although variations of the production levels have a more reduced effect than similar sales cost variations. A five percent reduction in production gives about a 23 percent reduction in DCFROI.

11.5 Manufacturing Cost Overruns

The estimates used in calculating the DCFROI's are based on actual operating plant experience. Increases in raw materials and labour costs should remain in proportion to sales prices. However, should the cost of these items increase substantially without a corresponding increase in sales prices, then the project returns are greatly affected and can be quickly pushed into a loss position.

Manufacturing Cost	DCFROI
-10% (Reduced Costs)	23.1%
Base	13.4%
+5% (High Costs)	8.8%
+10% (Higher Costs)	4.1%
+15% (Higher Costs)	No Return (Negative)

It can be seen that a five percent change in manufacturing costs results in a 51 percent change in DCFROI. It is evident that production costs have almost as significant a effect on the plant profitability as the sales price.

NGM INTERNATIONAL

Detailed Feasibility Study - Phase III

Waferboard/OSB Plant

for

Northwestern New Brunswick

Department of Commerce and Technology

Job No. 3961

12. Plant Size Comparison: Entry Level VS Large Capacity Plant

Following is a comparison of various major parameters for the entry level sized plant versus a larger capacity plant constructed at the same site, similar in size to other large capacity plants currently under construction in Canada.

	Entry Level Plant	Large Capacity Plant
Annual Production (MMSF 3/8")	138	260
Press Size	8' x 16' x 9 Opng.	8' x 24' x 12 Opng.
Annual Wood Requirement (m^3/yr)	244,000	463,000
Staff (Oper. & Admin.)	94	97
Capital Cost	$42,000,000	$59,000,000
Mill Net Sales Price	$154.49/MSF (3/8")	$154.49/MSF (3/8")
Annual Sales	$24.9 x 10^6/yr.	$46.9 x 10^6/yr.
DCFROI, After Taxes	13.4%	32%
Owners Equity	$10 x 10^6	$15 x 10^6
Construction Time	20 Months	20 Months

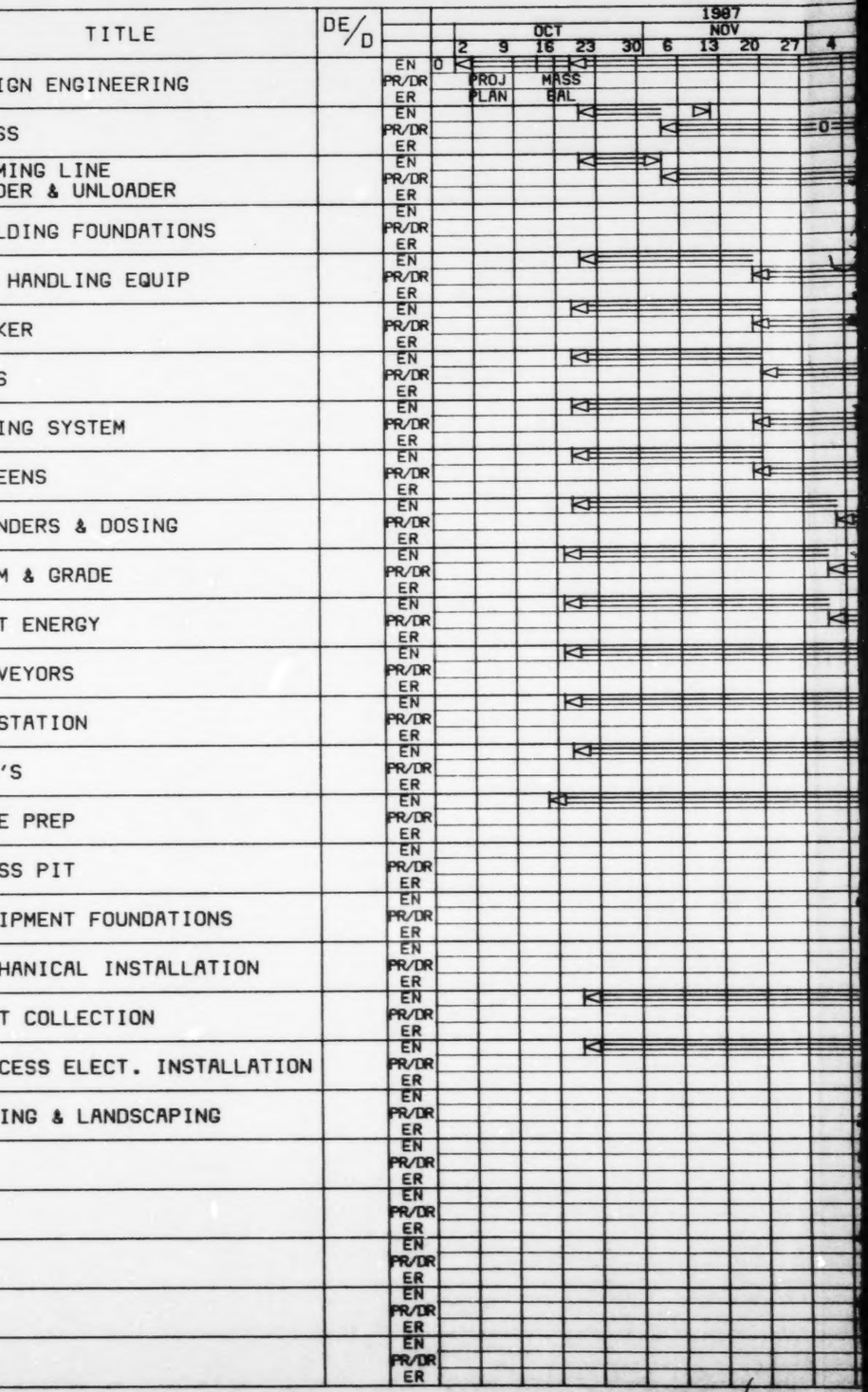
It can be seen that the larger capacity plant offers substantial advantages from a profitability potential point of view, due to lower relative equipment, operating and overhead costs.

However, it must be remembered that the raw wood requirement is substantially higher, as well as the sales volume.

Capital investment by the Owner, on the other hand is only somewhat higher.

It should be noted that the larger capacity plant offers much greater resistance to market price fluctuations and other operating concerns.

NO.	TITLE	DE/D	
1	DESIGN ENGINEERING		EN PR/DR ER
2	PRESS		EN PR/DR ER
3	FORMING LINE LOADER & UNLOADER		EN PR/DR ER
4	BUILDING FOUNDATIONS		EN PR/DR ER
5	LOG HANDLING EQUIP		EN PR/DR ER
6	FLAKER		EN PR/DR ER
7	BINS		EN PR/DR ER
8	DRYING SYSTEM		EN PR/DR ER
9	SCREENS		EN PR/DR ER
10	BLENDERS & DOSING		EN PR/DR ER
11	TRIM & GRADE		EN PR/DR ER
12	HEAT ENERGY		EN PR/DR ER
13	CONVEYORS		EN PR/DR ER
14	SUBSTATION		EN PR/DR ER
15	MCC'S		EN PR/DR ER
16	SITE PREP		EN PR/DR ER
17	PRESS PIT		EN PR/DR ER
18	EQUIPMENT FOUNDATIONS		EN PR/DR ER
19	MECHANICAL INSTALLATION		EN PR/DR ER
20	DUST COLLECTION		EN PR/DR ER
21	PROCESS ELECT. INSTALLATION		EN PR/DR ER
22	PAVING & LANDSCAPING		EN PR/DR ER
			EN PR/DR ER
			EN PR/DR ER
			EN PR/DR ER
			EN PR/DR ER
			EN PR/DR ER



1987 | 1988

NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEPT | OCT | NOV

23 30 6 13 20 27 4 11 18 25 1 8 15 22 29 5 12 19 26 4 11 18 25 1 8 15 22 29 6 13 20 27 3 10 17 24 1 8 15 22 29 5 12 19 26 2 9 16 23 30 7 14 21 28 4 11 18 25 2 9

PREPARE G.A.'S

PRESS MFG & DEL

FORMING LINE MFG & DEL

FINALIZE G.A.'S

BLDG MFG & DEL

BLDG ERECTION

INSTALL

M & D

INSTALL BLEN

INSTALL T & G

INSTALL SUBSTATION

SITE PREP

INSTALL FDNS & SLAB

INSTALL DUST C

PAVING & LANDSCAPING

AUG 5 12 19 26 | SEPT 2 9 16 23 30 | OCT 7 14 21 28 | NOV 4 11 18 25 | DEC 2 9 16 23 30 | 1989 JAN 6 13 20 27 | FEB 3 10 17 24 | MAR 3 10 17 24 31 | APR 7 14 21 28 | MAY 5 12 19 26 | JUN 2 9 16 23 30 | JUL 7 14 21 28 | AUG

ACTUAL M.H. TO DATE | ESTIM DFTG M.H. | REV | % COMP

PRESS ERECTION
POWER & CONTROLS
CHECKS
PRELIM RUNS
FIRST BOARD MAY 23/89
INSTALL
POWER & CONTROLS
CHECKS
BLDG ERECTION
WOOD HANDLING ERECTION
POWER & CONTROLS
FLAKER ERECTION
POWER & CONTROLS
BINS & INST.
POWER & CONTROLS
INSTALL DRYERS
POWER & CONTROLS
INSTALL SCREENS
POWER & CONTROLS
INSTALL BLENDERS
POWER & CONTROLS
INSTALL T & G
POWER & CONTROLS
INSTALL HEAT ENERGY
POWER & CONTROLS
INSTALL CONV
POWER & CONTROLS
INSTALL SUBSTATION
INSTALL MCC
INSTALL FDNS & SLAB
MECH INSTALL
INSTALL DUST COLLECTION
ELECT. INSTALL
PAVING & LANDSCAPING

23 30	JUL 7 14 21 28	AUG	ACTUAL M.H. TO DATE	ESTIM DFTG M.H.	R E V	% COMP
					M C G	

KEY:

DE - DESIGN ENGINEER
D - DRAFTSMEN
EN - ENGINEERING
PR - PURCHASING
DR - DRAFTING
ER - **ERECTION**
O - SCHEDULE ORDER
PM - PROJECT MANAGER
T - TOTAL MAN HOURS
M - MANUAL
C - CADD
G - MICROGRAPHICS
= - WORK SCHEDULED
▬ - WORK COMPLETED
▽ - EARLIEST START
△ - LATEST COMPLETION
□ - DELIVERY

DISTR:

NOTES:

REVISIONS

NO	DATE	BY	NO	DATE	BY

DESIGNED JRB	DRAWN TAT
CHECKED DESIGN / DFTG.	DATE AUG 20/87
	SCALE N.T.S.
APPROVED	SPEC.
P.N. JRB / P.T. MCH	A3506B A3507A

NGM *NGM International*
Fredericton, N.B., Canada

DEPARTMENT OF COMMERCE AND TECHNOLOGY

FREDERICTON NEW BRUNSWICK

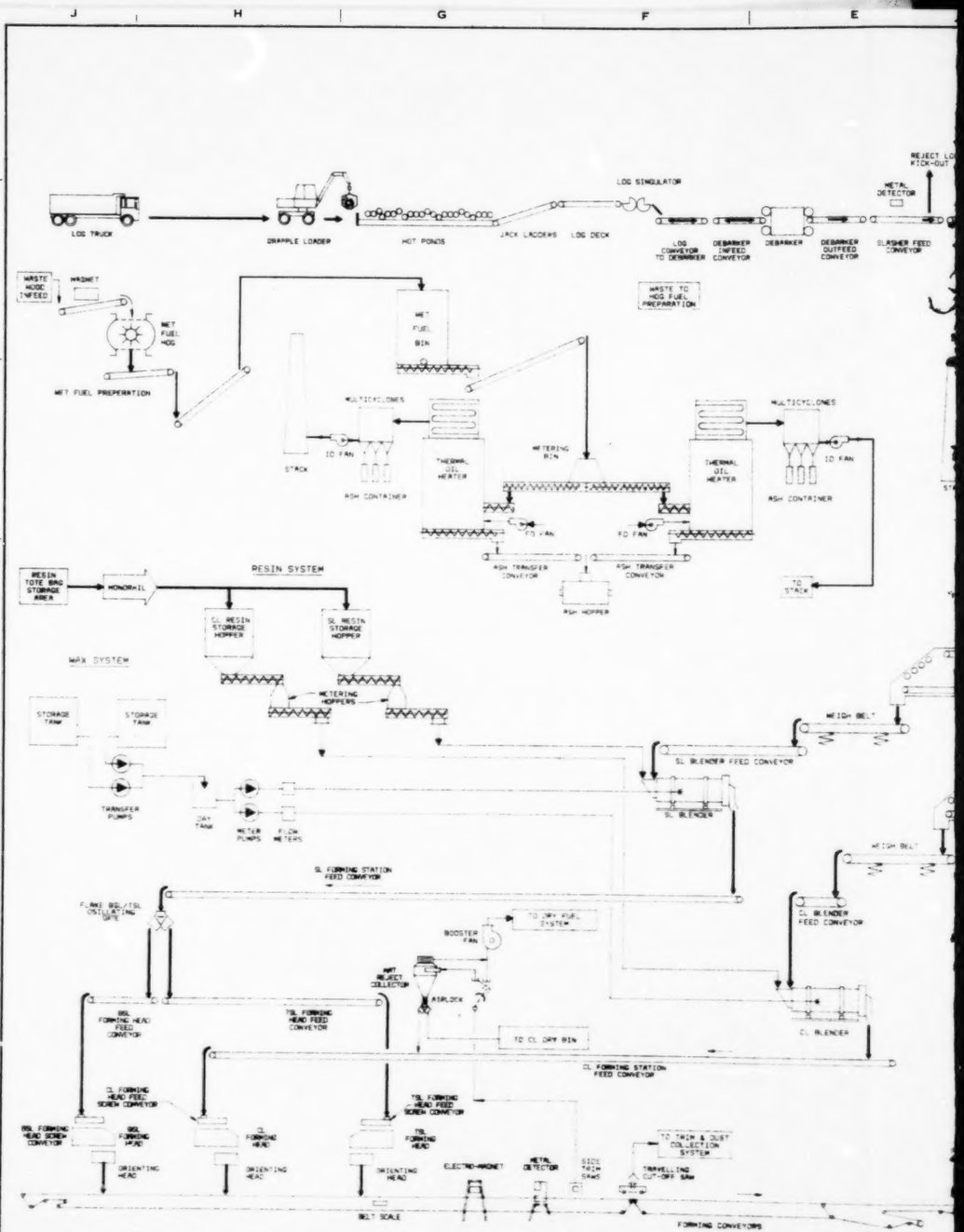
OSB PLANT—NORTHWESTERN NEW BRUNSWICK

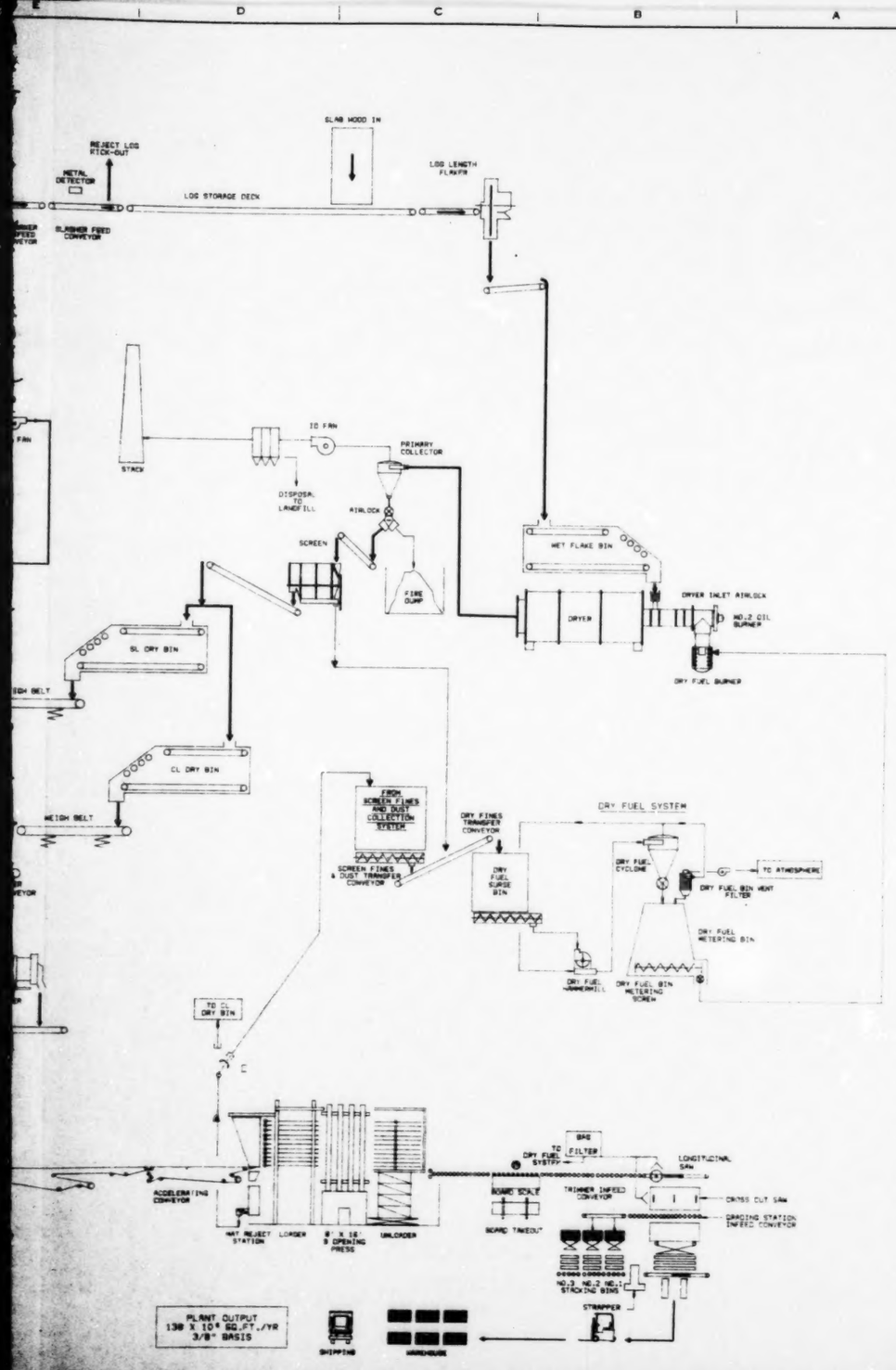
JOB SCHEDULE AND PROGRESS REPORT

JOB NO.	DWG. NO.	REV.
3961	B-601	0

G-401

3961





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□ APPROVED FOR CONSTRUCTION
□ SUPERSEDES ALL PREVIOUS ISSUES

BY _____ DATE _____

REFERENCE DRAWINGS

DWG NO.	TITLE	BY

LEGEND
SL - SURFACE LAYER
CL - CORE LAYER
BSL - BOTTOM SURFACE LAYER
TSL - TOP SURFACE LAYER

REV	ISSUED TO	ISSUED FOR
0	SEPT. 30, 1987 CLIENT	INFORMATION

NO.	DATE	BY	REVISIONS	CHD

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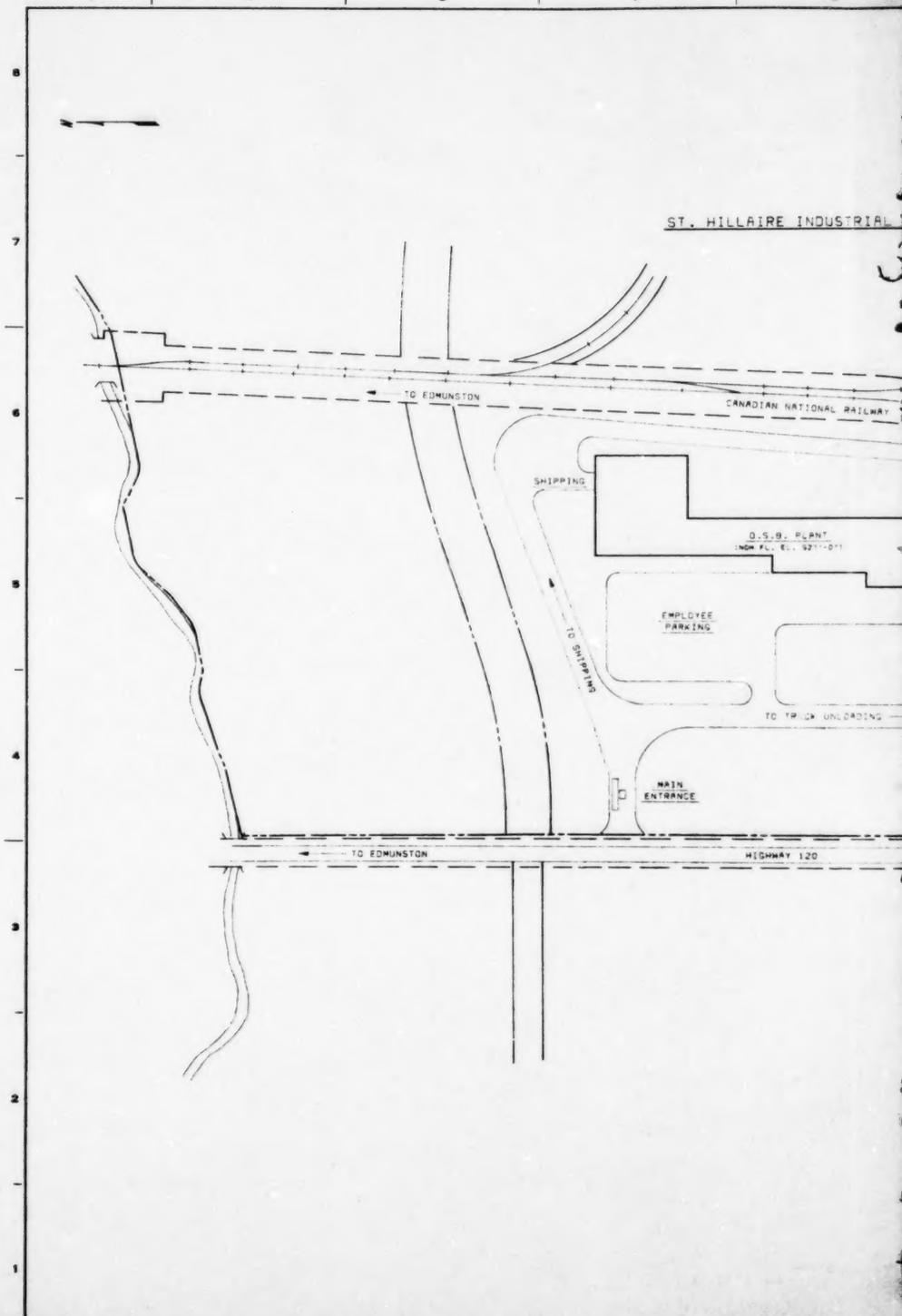
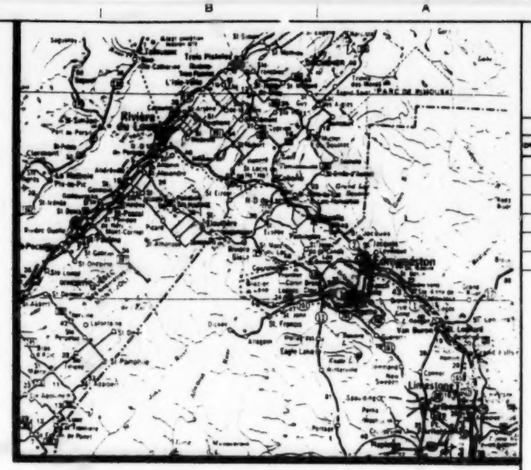
DEPARTMENT OF COMMERCE AND TECHNOLOGY
FREDERICTON NEW BRUNSWICK
OSB PLANT-NORTHWESTERN NEW BRUNSWICK
PRELIMINARY PROCESS FLOW DIAGRAM 138 X 10⁶ SQ.FT./YR PLANT

JOB NO. 3961 DWG. NO. G-401 REV. 0

3961 G-001





NDUSTRIAL PARK

ONAL RAILWAY

HOT PONDS

WOOD YARD
125,000 CORDS

K UNLOADING

PRELIMINARY – NOT FOR CONSTRUCTION

APPROVED FOR CONSTRUCTION

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BY _____ DATE _____

REFERENCE DRAWINGS

DWG. NO.	TITLE	BY

NO.	DATE	BY	REVISIONS
0			RELEASED FOR CLIENT INFORMATION

REV.	ISSUED TO	ISSUED FOR

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Fredericton, N.B., Canada

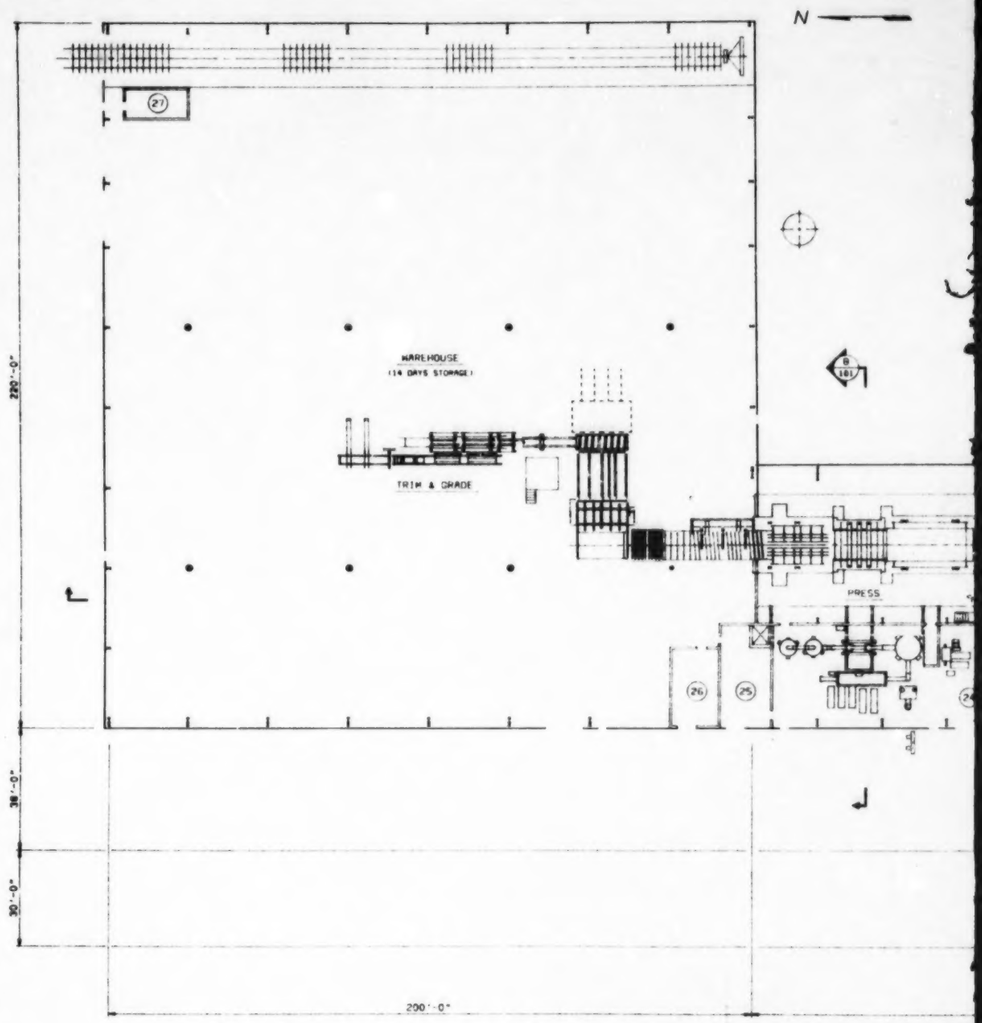
DEPARTMENT OF COMMERCE AND TECHNOLOGY

FREDERICTON NEW BRUNSWICK

OSB PLANT-NORTHWESTERN NEW BRUNSWICK

PRELIMINARY SITE LAYOUT

JOB NO. 3961 DWG. NO. G-001 REV. 0



N

PRESS

FORMERS

BLENDERS

DRY BINS

SCREEN

WET BIN
DRYER
BELOW

HEAT
ENERGY

WET FUEL

HOG

FLAKER

DEBARKER

FUEL PREP.

SLAB HOOD IN

HOT
PONDS

180'-0"

300'-0"

240'-0"

150'-0"

220'-0"

15'-0"

25'-0"

PLANT OFFICE - 2ND LEVEL

- [x] PRELIMINARY-NOT FOR CONSTRUCTION
- [ ] APPROVED FOR CONSTRUCTION
- [ ] SUPERSEDES ALL PREVIOUS ISSUES

BY _____ DATE _____

REFERENCE DRAWINGS

DWG. NO.	TITLE	BY

ROOM LEGEND

1 - ELECTRICAL RM #1
2 - ELECTRICAL RM #2
(DRYER/M.E. CONTROL RM-ABOVE)
3 - LABORATORY
4 - RESIN STORAGE (POWDERED)
5 - WAX STORAGE
6 - RESIN METERING
7 - ELECTRICAL RM #3
8 - MEN'S W.R.
9 - WOMEN'S W.R.
10 - MACHINE SHOP
11 - ELECTRICAL SHOP
12 - ELECTRICAL FOREMAN
13 - MACHINE SHOP FOREMAN
14 - PURCHASING AGENT
15 - MAINTENANCE SHOP
16 - STORES
17 - SHIFT FOREMAN
18 - GENERAL FOREMAN
19 - FIRST AID
20 - LUNCH RM
21 - MEN'S W.R.
22 - ELECTRICAL RM #4
23 - PRESS CONTROL
24 - HYDRAULICS RM
25 - THERMAL OIL
26 - ELECTRICAL RM #5
27 - SHIPPING OFFICE
28 - SALES
29 - ACCOUNTANT
30 - PERSONNEL
31 - CLERICAL
32 - COMPUTER RM
33 - KITCHEN
34 - FUTURE OFFICE
35 - RECEPTION
36 - WOMEN'S W.R.
37 - MEN'S W.R.
38 - ADMINISTRATIVE ASSISTANT
39 - PLANT SUPER
40 - GENERAL MANAGER
41 - CONFERENCE RM
42 - MEN'S W.R.

(F) - FUTURE EQUIPMENT

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0	SEPT 30, 1987 CLIENT	INFORMATION

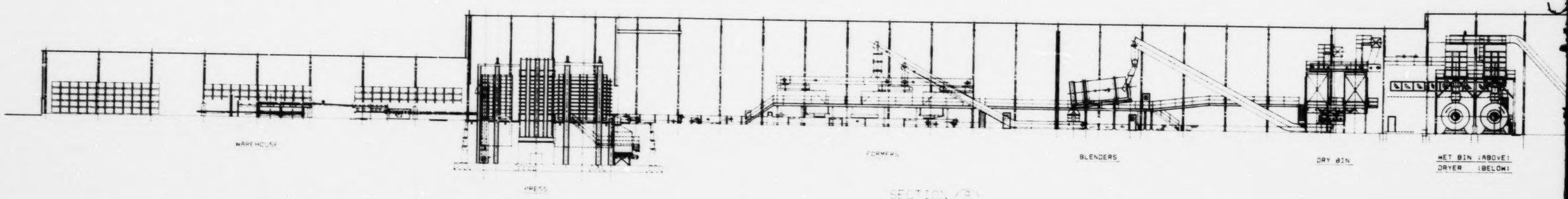
REVISIONS

DEPARTMENT OF COMMERCE AND TECHNOLOGY

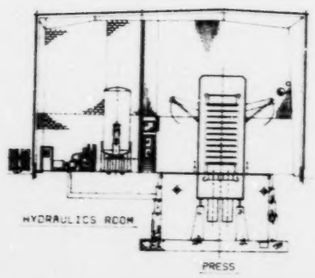
PROJECTION

PRELIMINARY
GENERAL ARRANGEMENT
PLAN

JOB NO. 3961 DWG. NO. G-101



SECTION (B) 101



SECTION (B) 101
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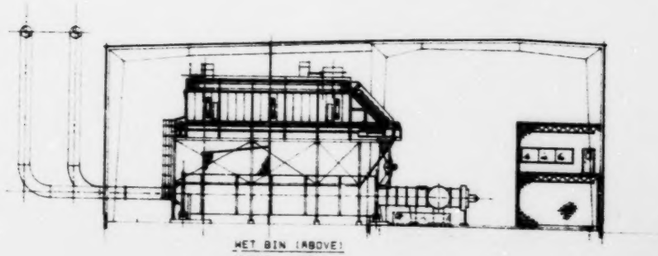

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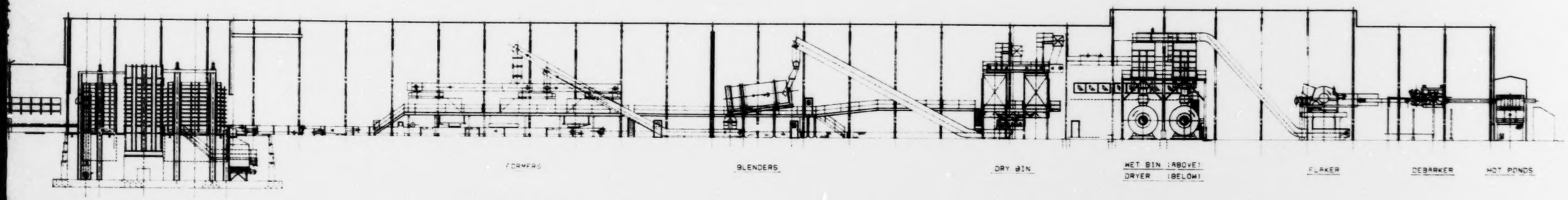

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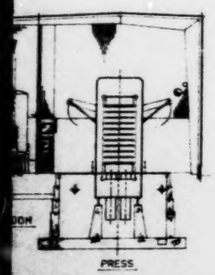

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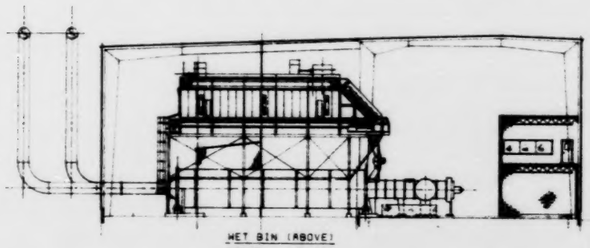

SECTION (C)
SCALE: 1/8"=1'-0" 101

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DEPARTMENT OF COMMERCE AND TECHNOLOGY

PRELIMINARY
GENERAL ARRANGEMENT
SECTIONS

JOB NO. 3961 DWG NO. G-102